



1 : 240

[illegible]

MWD Run Number	100	200	300	400	
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MWD Run Number	100	200	300	400	
Date run completed	06-Dec-12	09-Dec-12	10-Dec-12	15-Dec-12	
Rig Bit Number	2	3	4	5	
Bit Size (in)	8.750	8.750	8.750	6.125	
Tool Nominal OD (in)	6.750	6.750	6.750	4.750	
Log Start Depth (MD, ft)	785.00	6,110.00	7,023.00	7,406.00	
Log End Depth (MD, ft)	6,110.00	7,023.00	7,406.00	14,063.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	05-Dec-12 11:00	07-Dec-12 09:15	09-Dec-12 06:55	11-Dec-12 10:35	
Drill/Wipe End Date and Time	06-Dec-12 18:55	08-Dec-12 18:14	09-Dec-12 22:34	14-Dec-12 12:15	
Min Inc (deg) @ Depth (MD, ft)	.17 @ 920.00	13.59 @ 6,114.00	51.72 @ 7,014.00	88.61 @ 8,165.00	
Max Inc (deg) @ Depth (MD, ft)	14.80 @ 3,938.00	50.05 @ 6,967.00	83.63 @ 7,347.00	92.68 @ 11,836.00	
Bit TFA(in2) / Bit Type	.75 / PDC	.86 / PDC	.86 / PDC	.46 / PDC	
Flow Rate (gpm)	586.00	553.00	560.00	270.00	
Max AV (fpm) / CV (fpm) @ MWD	427.3 / 427.3	441.5 / 441.5	462.9 / 462.9	520.8 / 520.8	
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	
Density (ppg) / Viscosity (spqt)	8.75 / 34.00	9.90 / 38.00	10.70 / 37.00	9.50 / 35.00	
Filtrate CL (ppm)	400.00	400.00	500.00	550.00	
pH / Fluid Loss (mptm)	9.60 / N/A	9.80 / N/A	9.30 / N/A	9.00 / N/A	
PV (cP) / YP (lbf2)	6 / 7.00	12 / 11.00	12 / 12.00	8 / 8.00	
% Solids / % Sand	4.6 / 0.25	9.3 / 0.5	11.7 / 0.25	6.2 / .25	
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Max Tool Temp (deg F) / S	151.45 / PDM	170.07 / PDM	177.10 / PDM	215.00 / PDM	

Max Tool Temp (degF) / Source	151.47 / PCM	170.37 / PCM	175.40 / PCM	245.03 / PCM	
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Lead MWD Engineer	Robert Ley	Robert Ley	Robert Ley	Robert Ley	
Customer Representative	Jeremy Stolz	Jeremy Stolz	Jeremy Stolz	Jeremy Stolz	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.76	5.76	5.76	5.76	
Sub Serial Number	11404261	11404261	11801534	11801534	
Insert Serial Number	11680740	11680789	11680740	11680740	
Date and Time Initialized	04-Dec-12 16:36	06-Dec-12 20:42	08-Dec-12 21:40	10-Dec-12 18:06	
Date and Time Read	06-Dec-12 22:42	09-Dec-12 00:28	10-Dec-12 04:04	15-Dec-12 00:35	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	57.00	54.00	54.00	65.00	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11404261	11404261	11801534	11801534	
Sonde Serial Number	11062120	10993273	11062120	11062120	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	259.20	327.03	168.00	108.44	

Gamma Ray Sensor Information

Tool Type		PCG	PCG	PCG	
Distance From Bit (ft)		46.96	46.76	58.19	
Recorded Sample Period (sec)		10	10	10	
Software Version		8.15	8.15	8.15	
Sub Serial Number		11404261	11801534	11801534	
Insert/Sonde Serial Number		11293393	11680942	11680942	

REMARKS

1. All depths are measured depths and are calibrated to the driller's pipe tally and are measured from the drill floor.

2. No depth corrections have been made for pipe stretch or compression.

3. All data presented is recorded (memory data) unless otherwise stated.

4. The Following smoothing parameters have been applied to the data"

PGRC (Gamma Ray Corrected):

Interval Resolution: 0.5 feet
Coercion Distance: 0.6 feet
Gap Fill: 3.0 feet

ROPA (Rate of Penetration):

Interval Resolution: 0.5 feet
Coercion Distance: 1.2 feet
Gap Fill: 3.0 feet

Insite Version 7.3.40 build 25

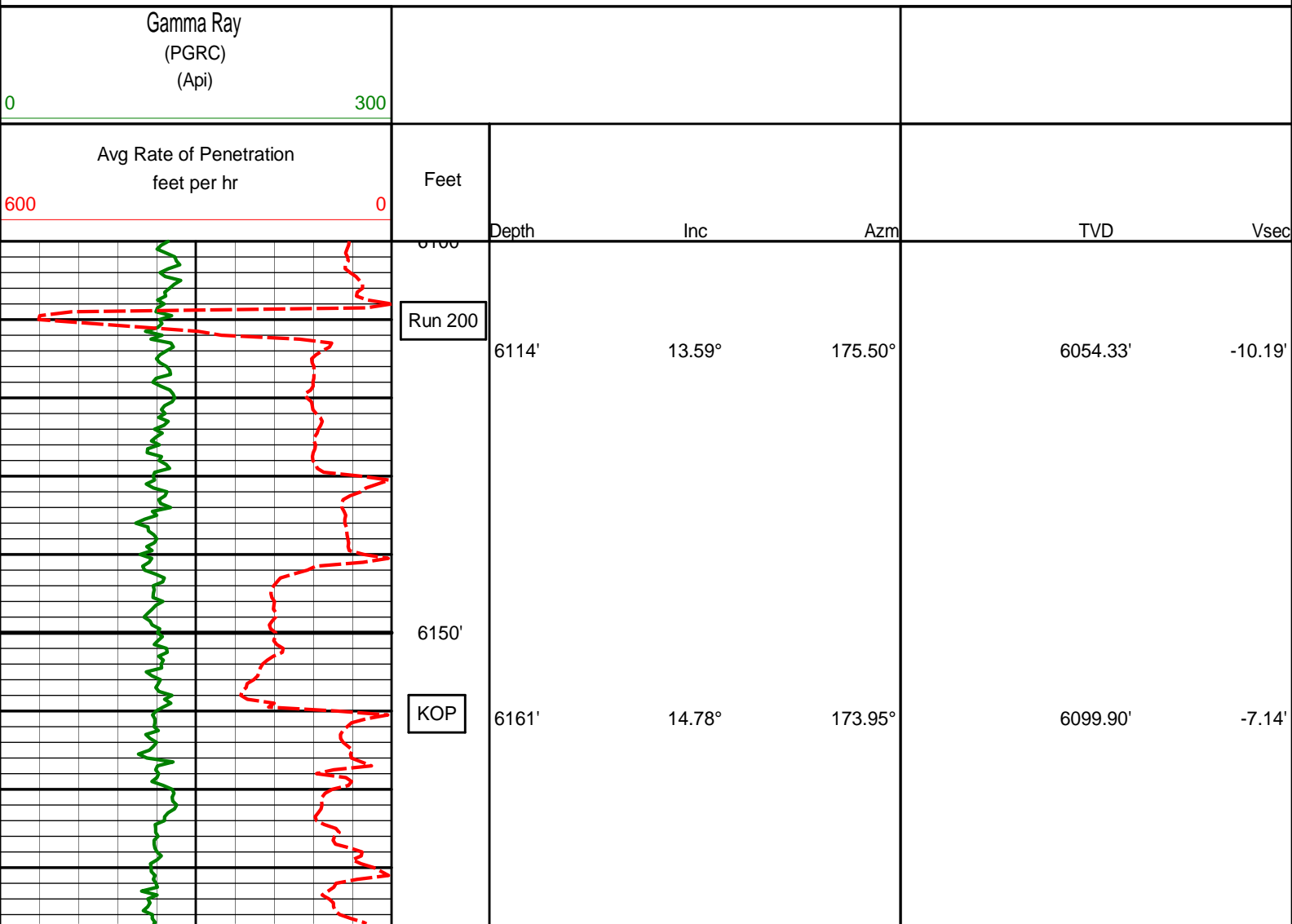
5. Survey at TD is projected to the bit

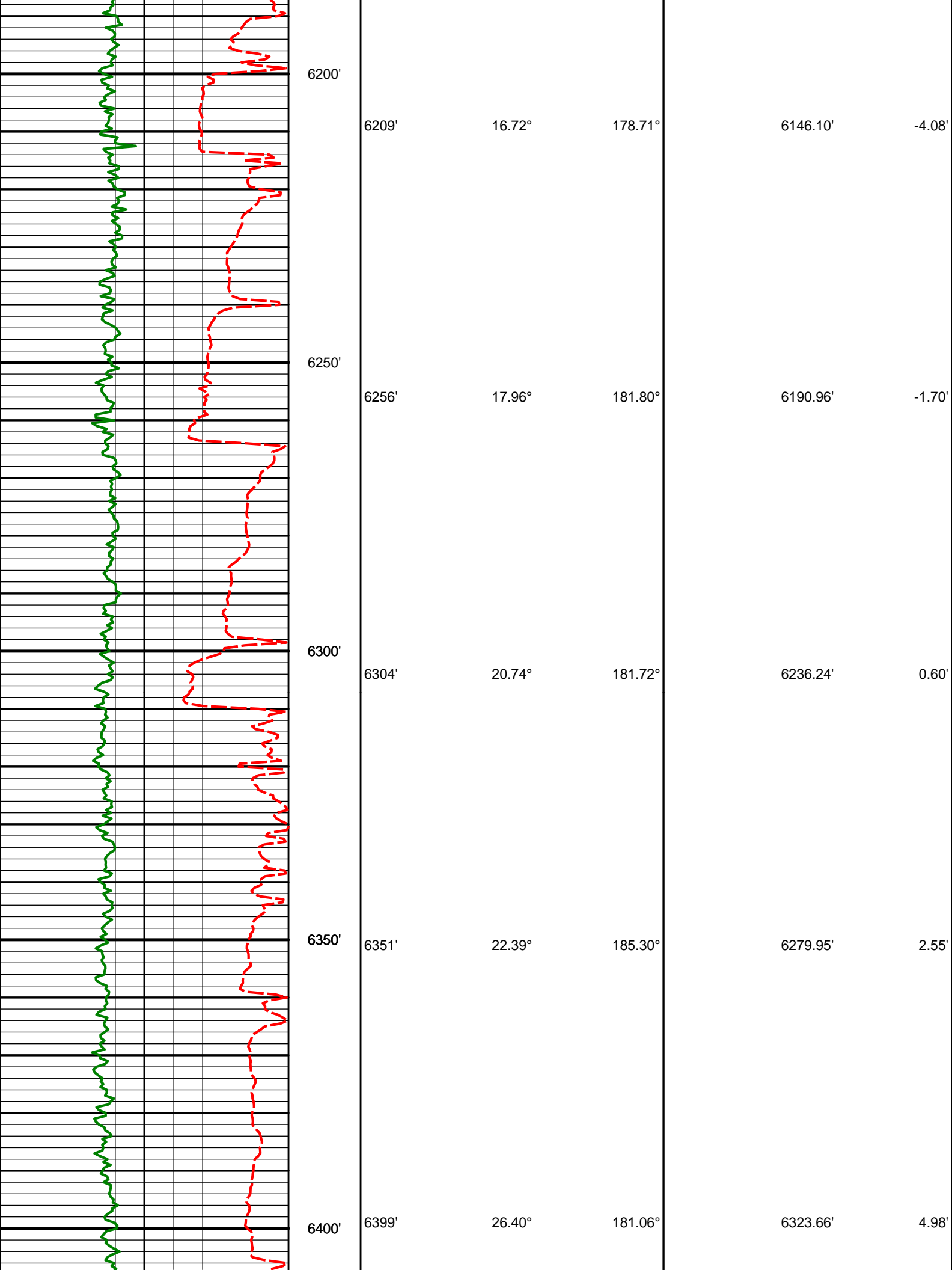
WARRANTY

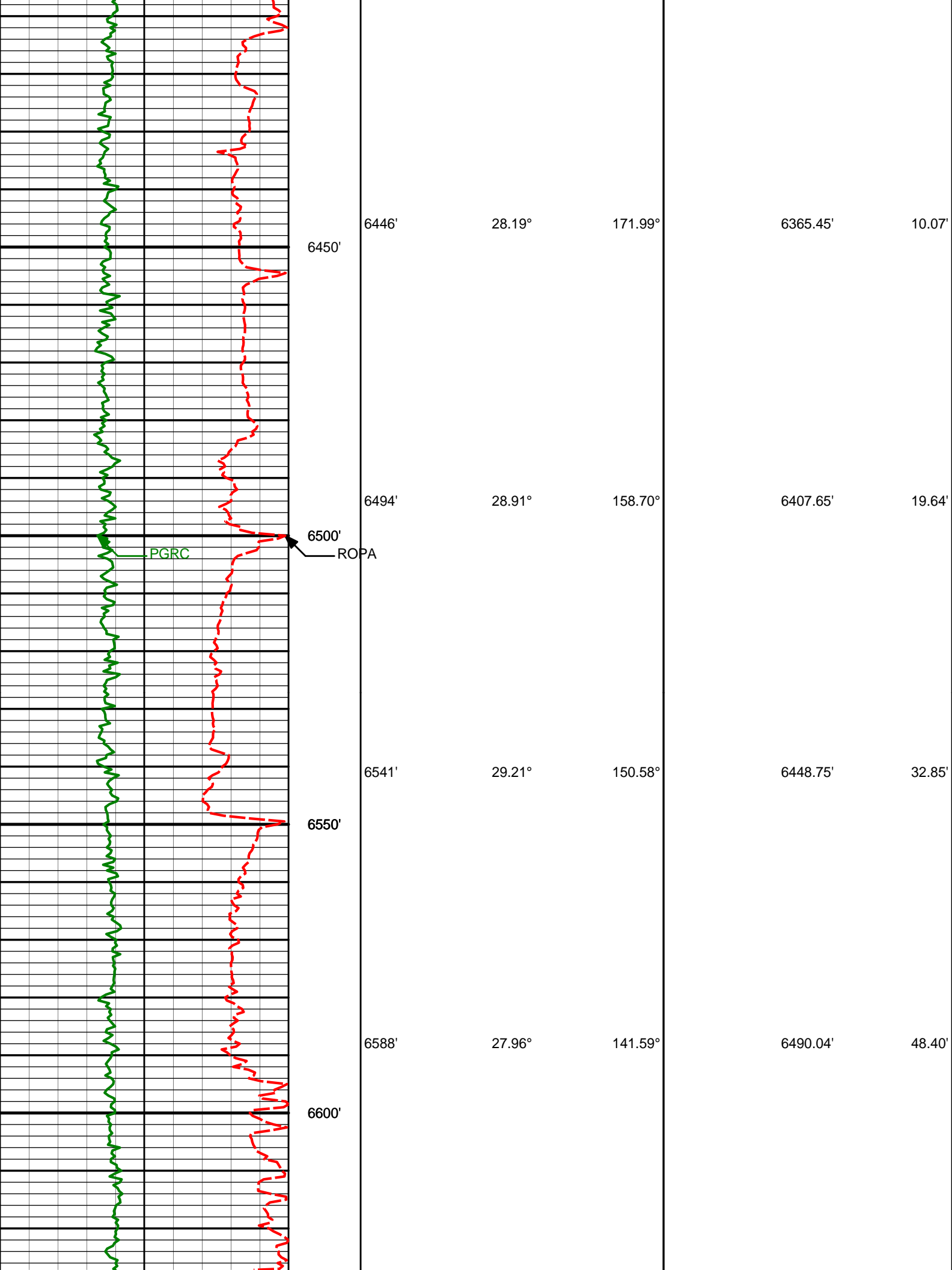
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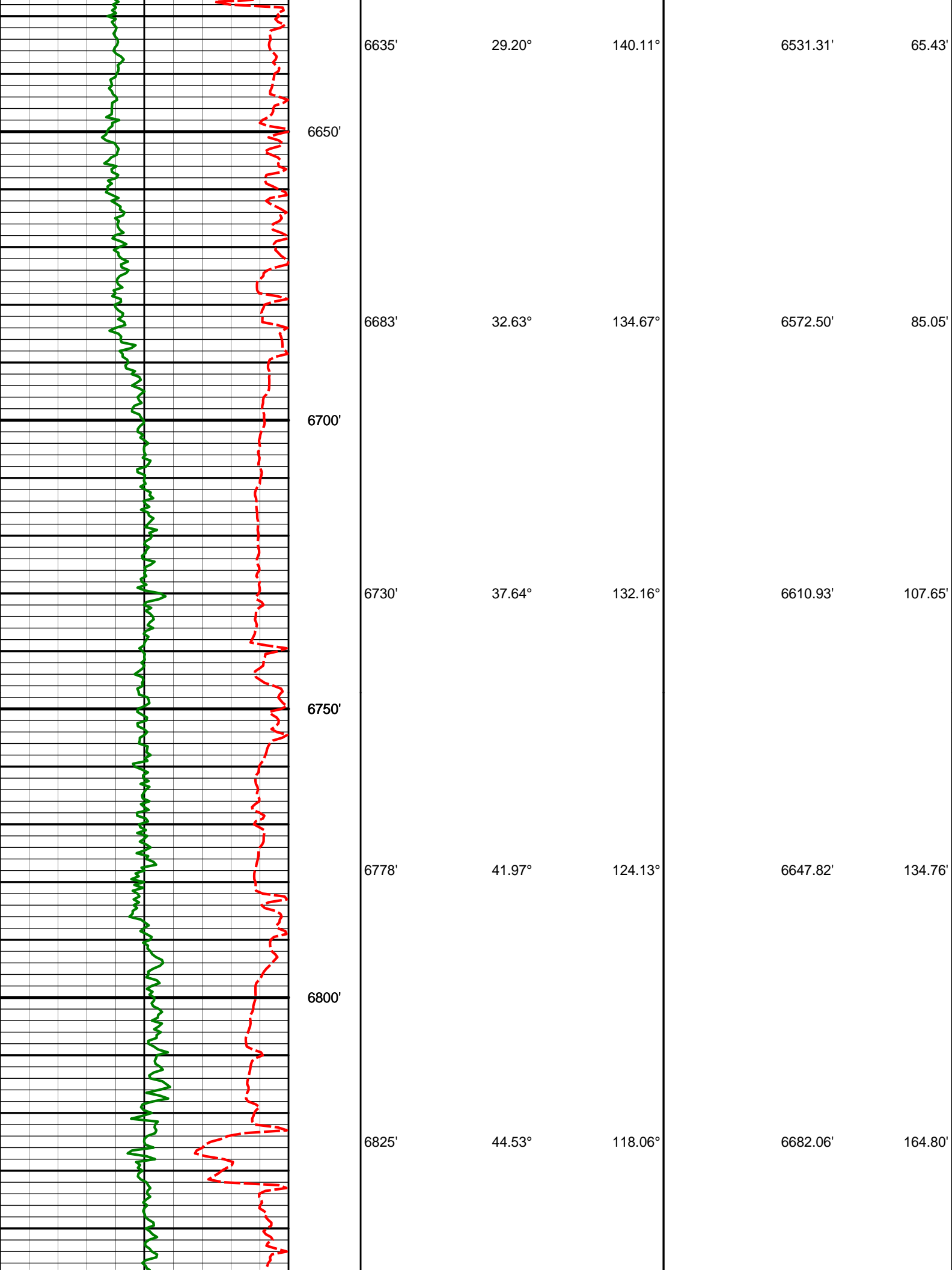
HALLIBURTON

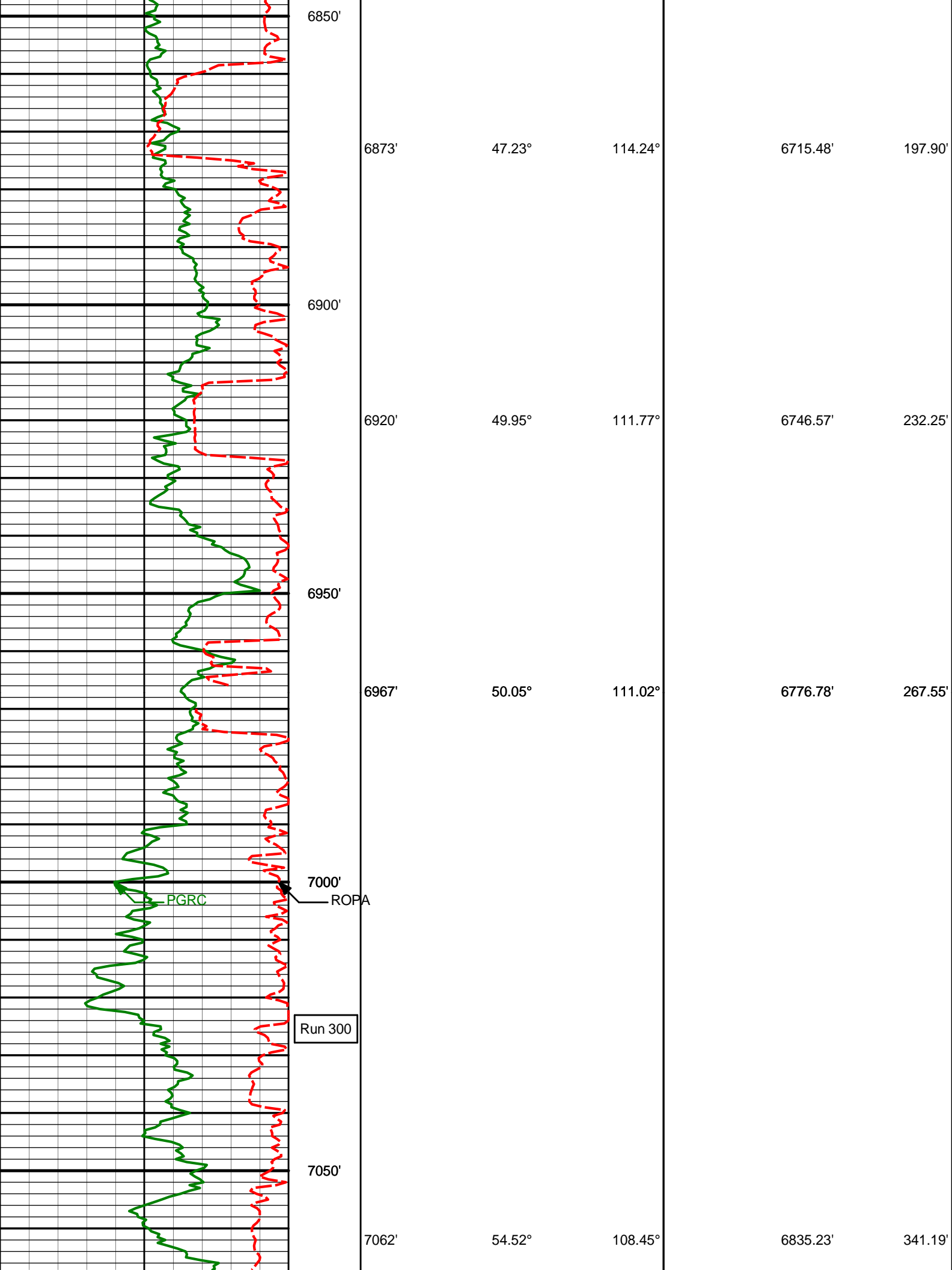
MD Detail Log 1:240

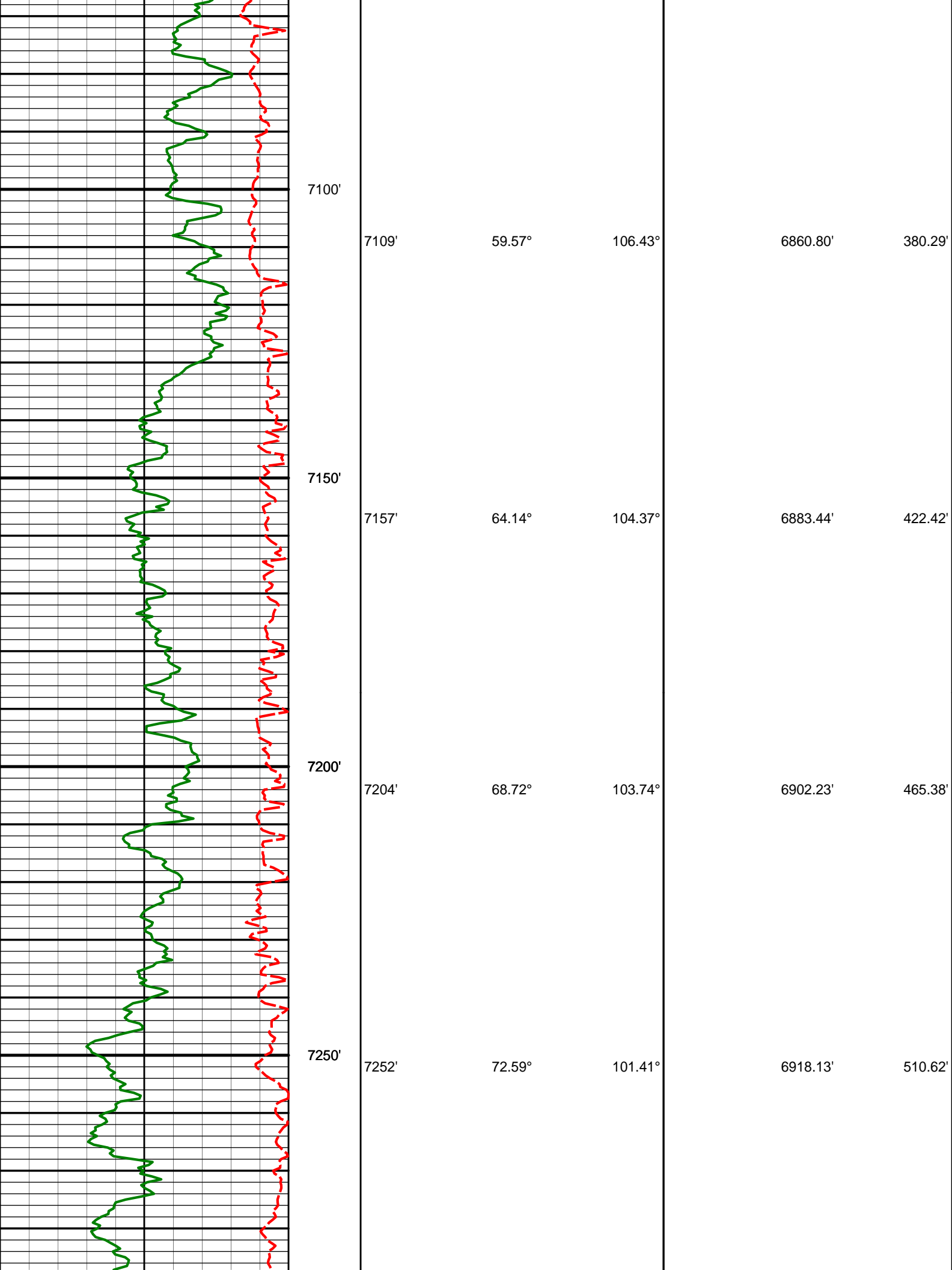


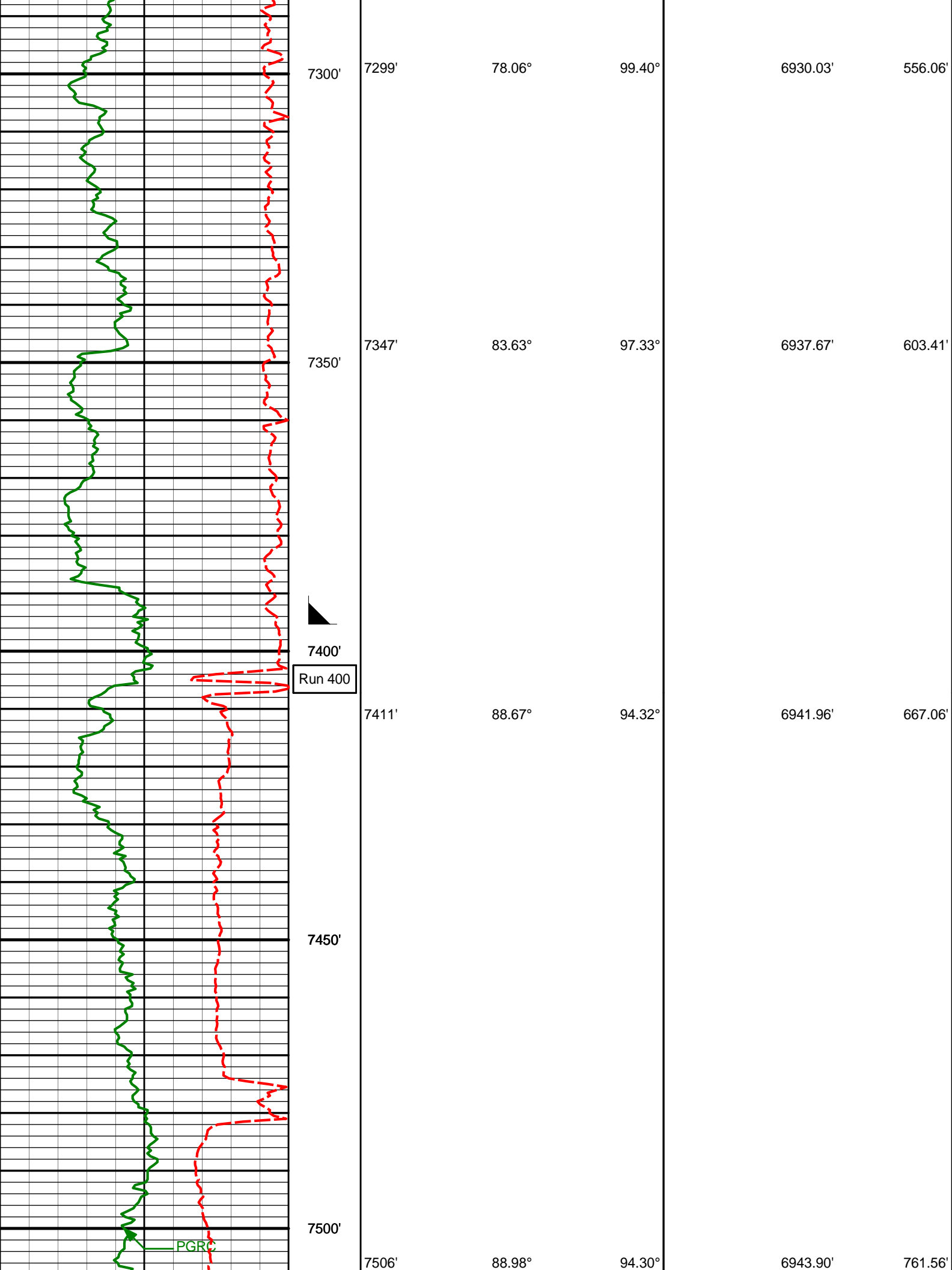


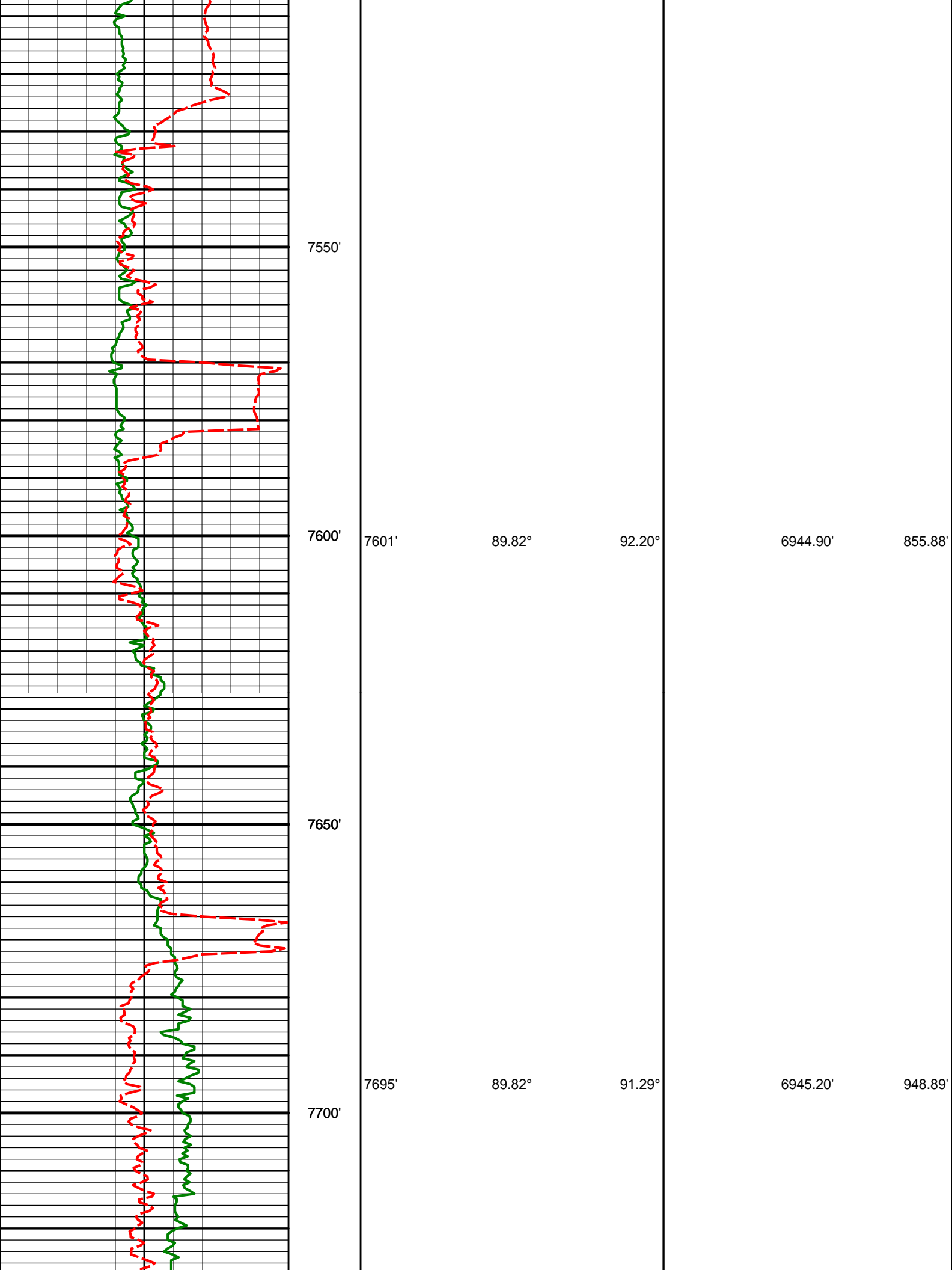


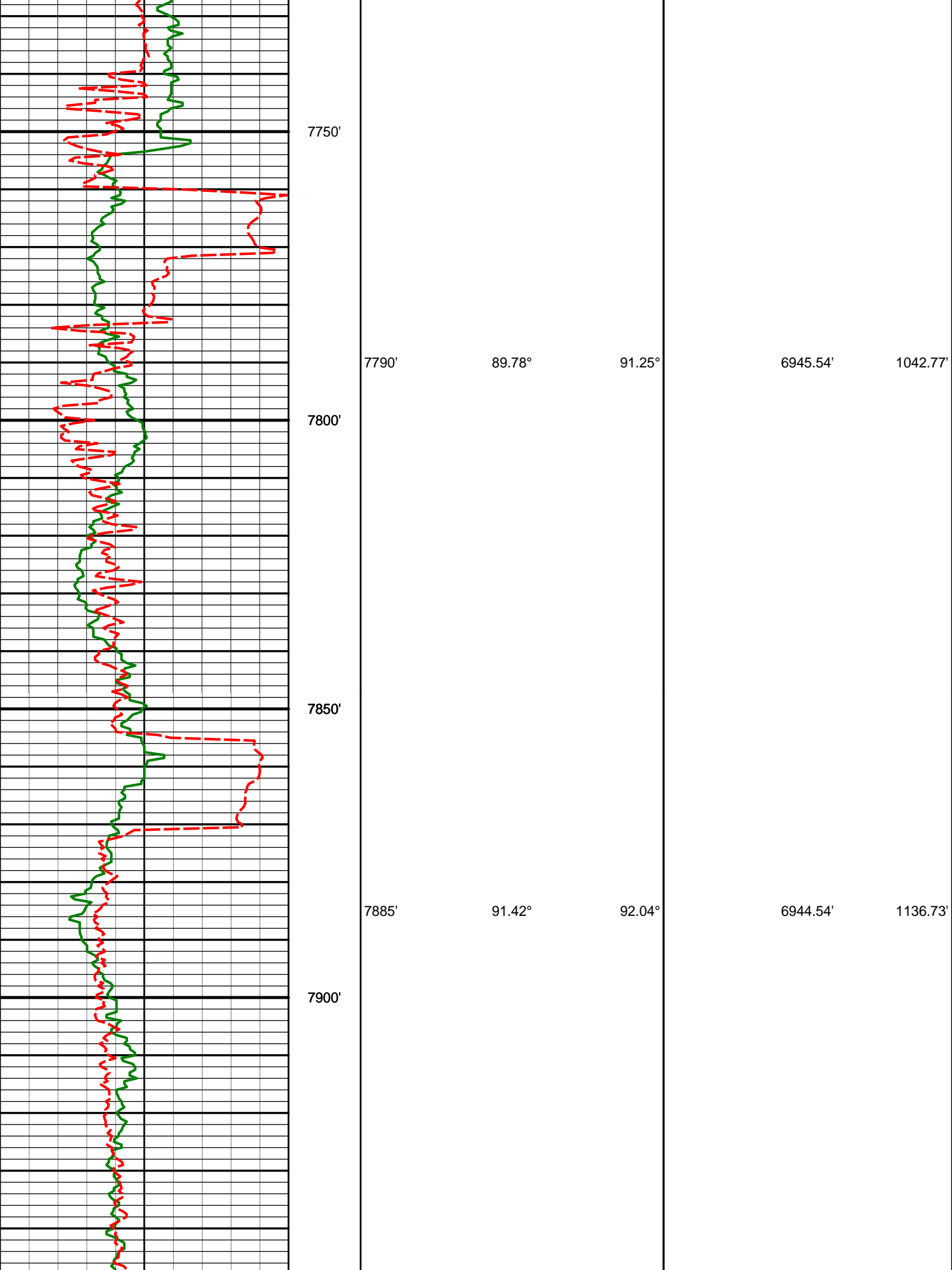


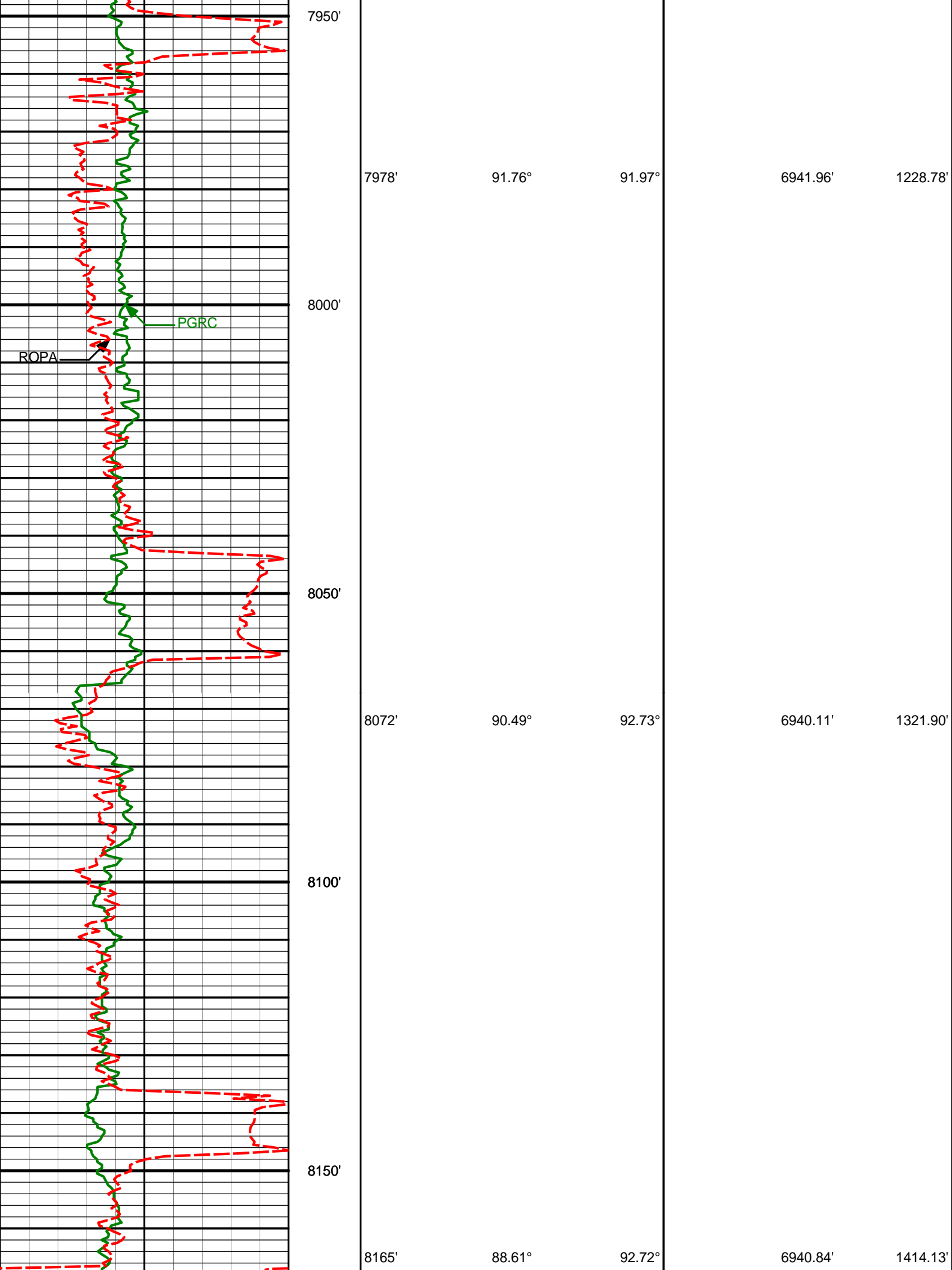


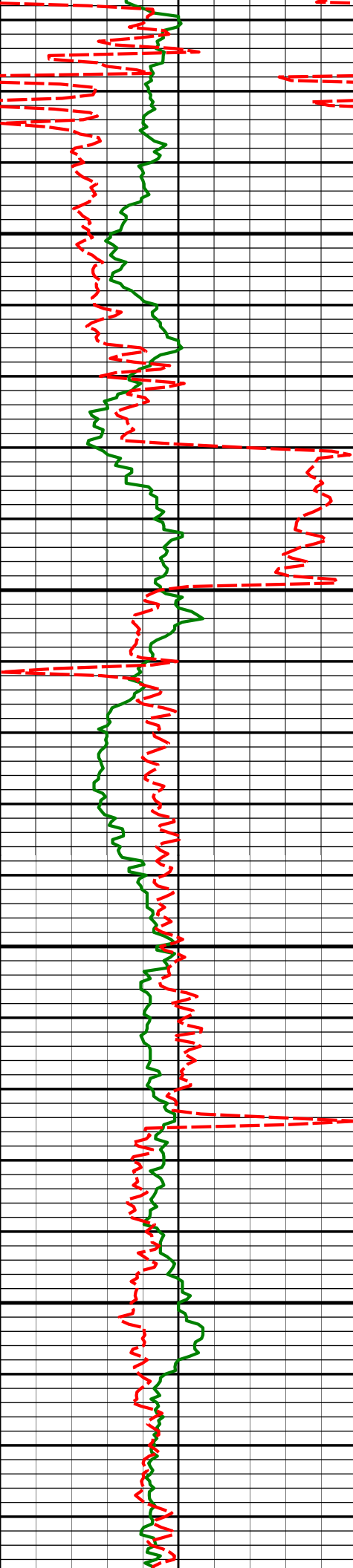












8200'

8250'

8258'

90.22°

92.10°

6941.79'

1506.29'

8300'

8350'

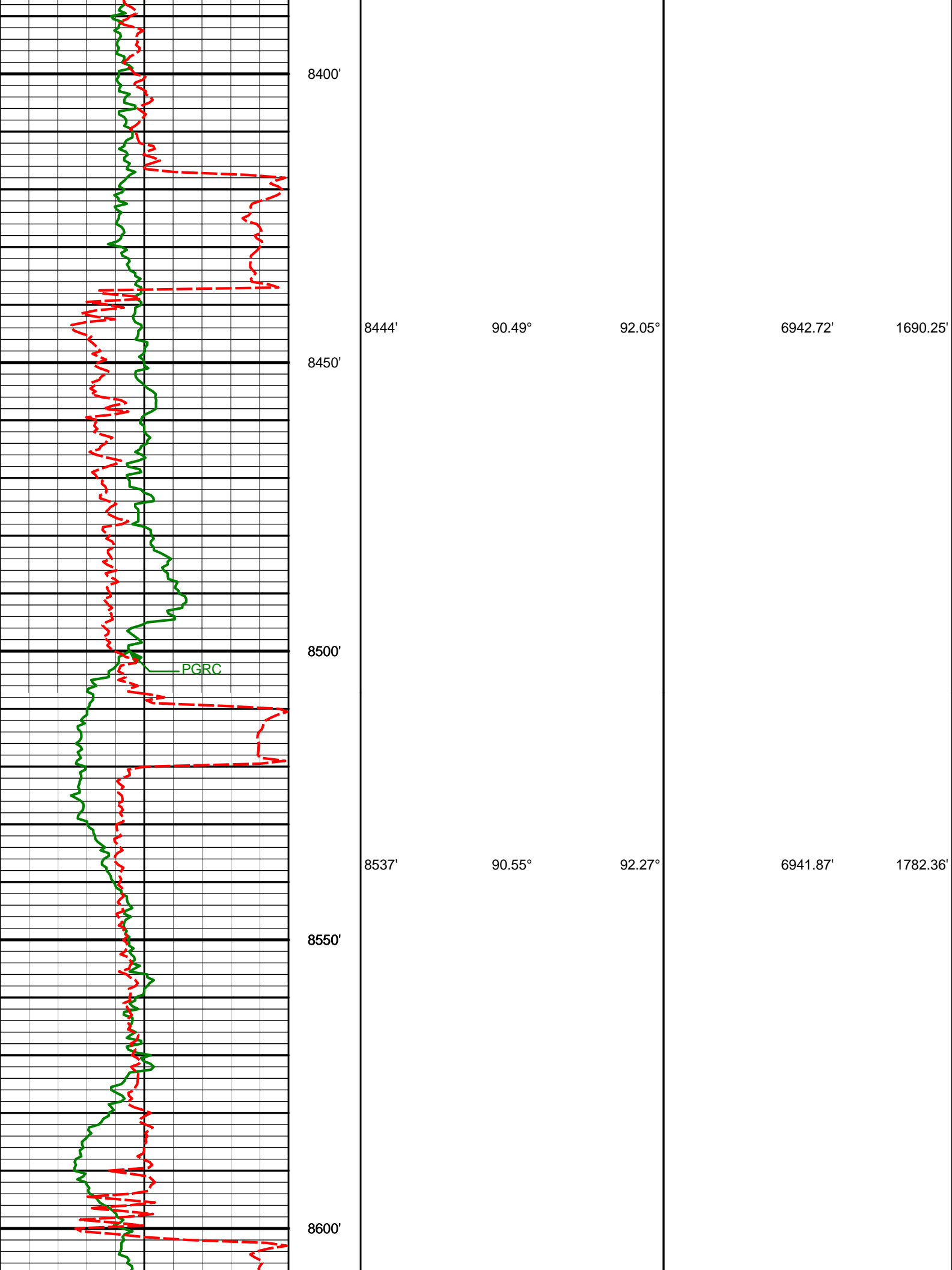
8351'

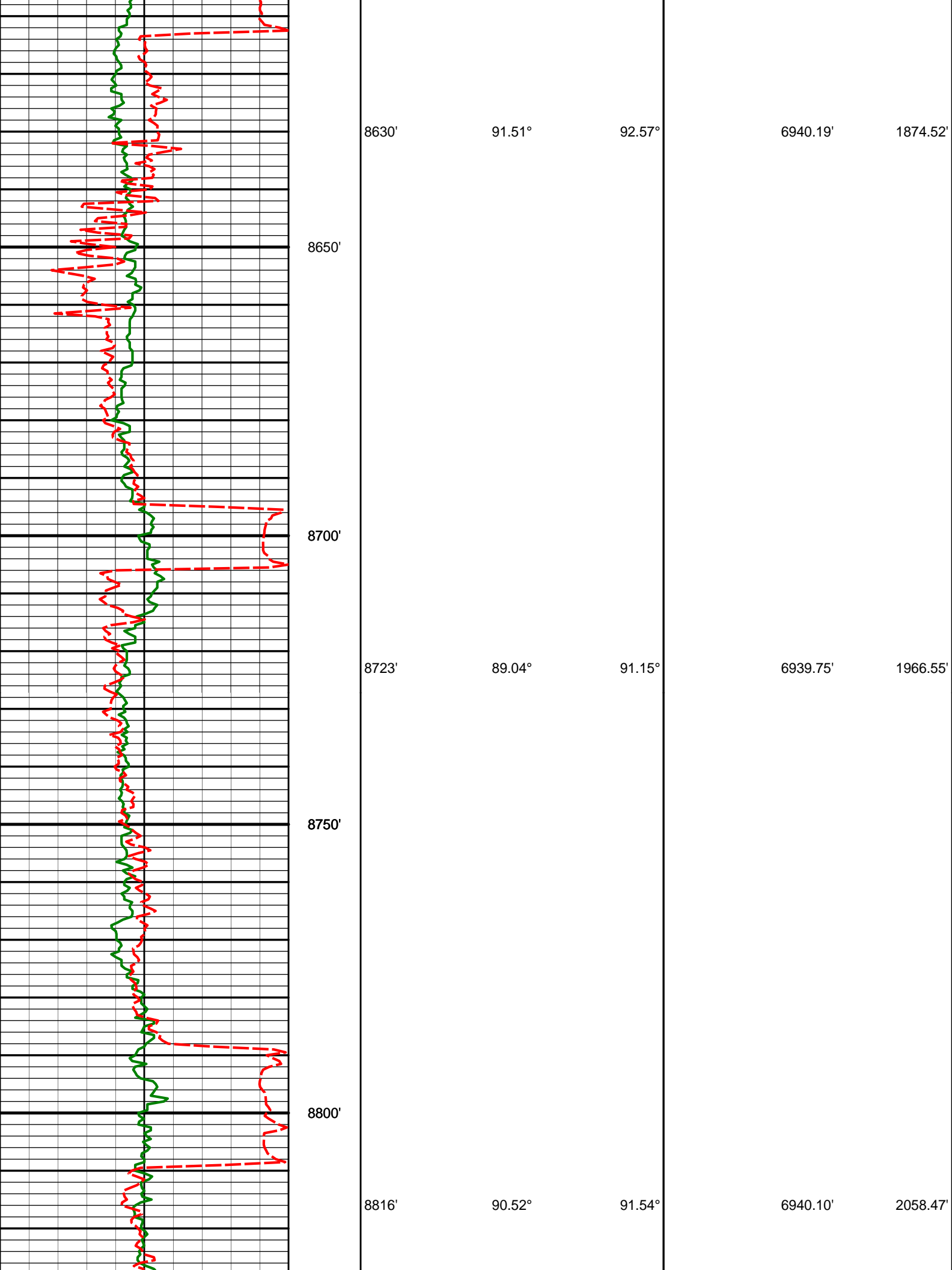
89.07°

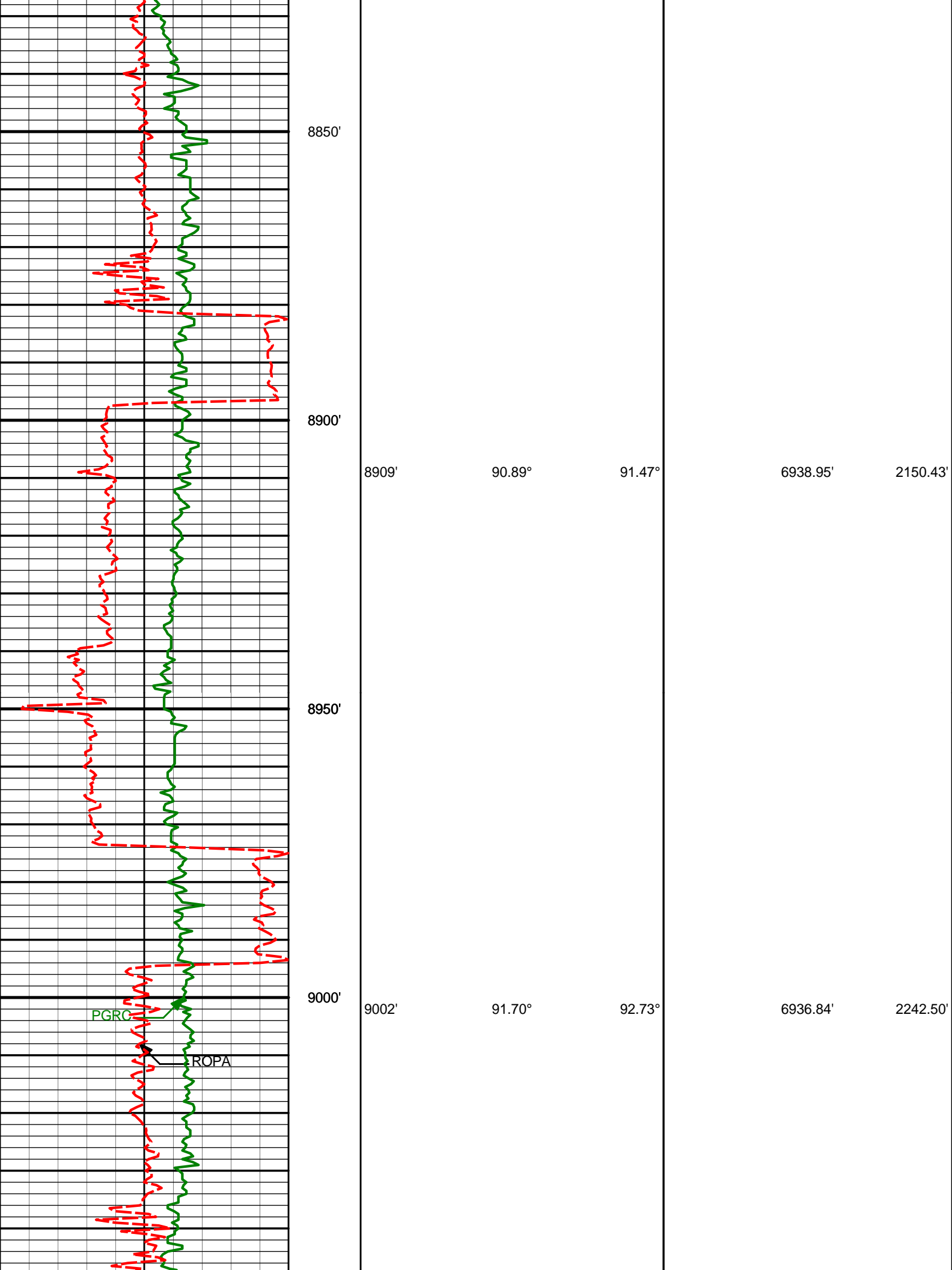
91.09°

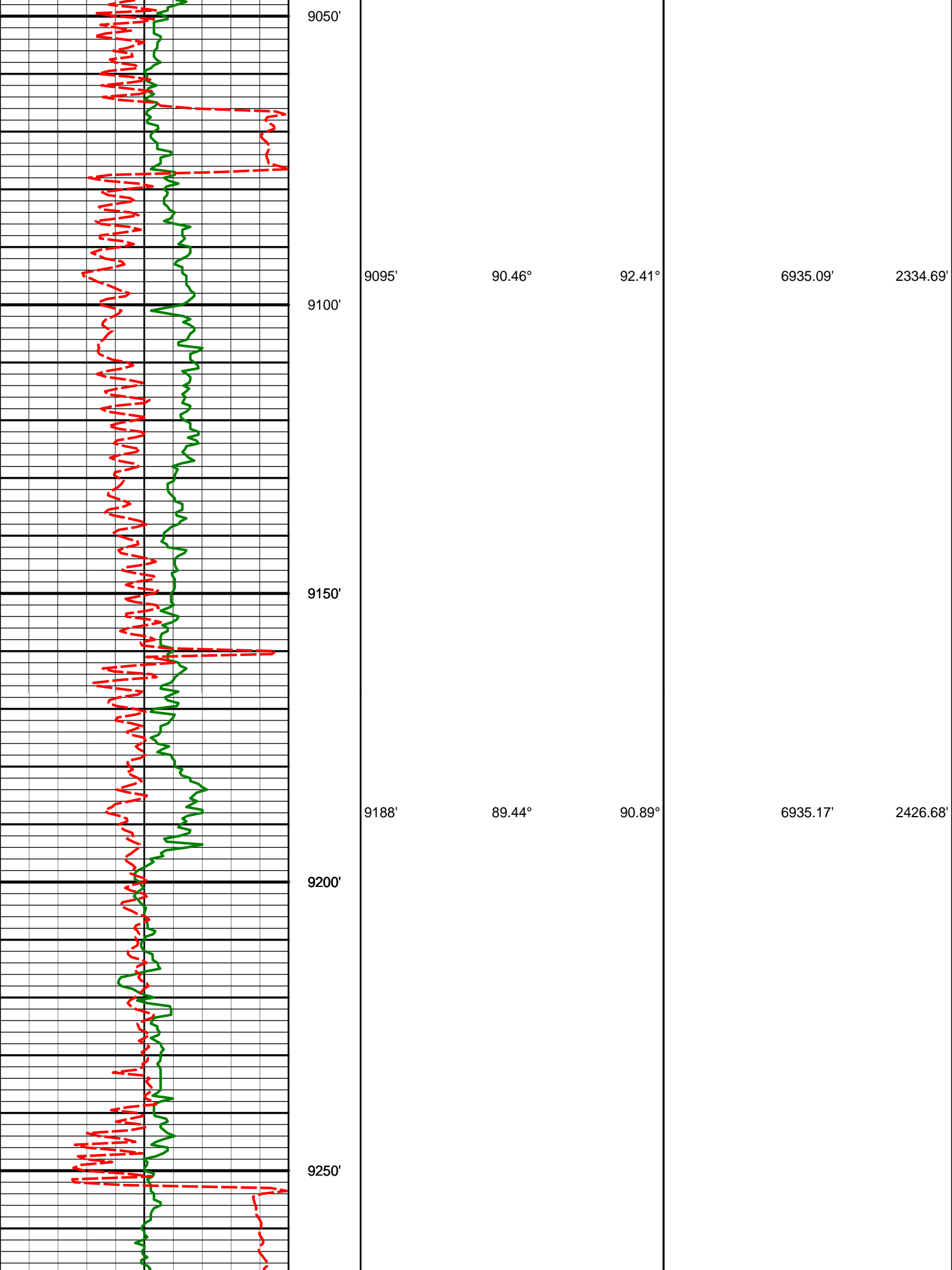
6942.37'

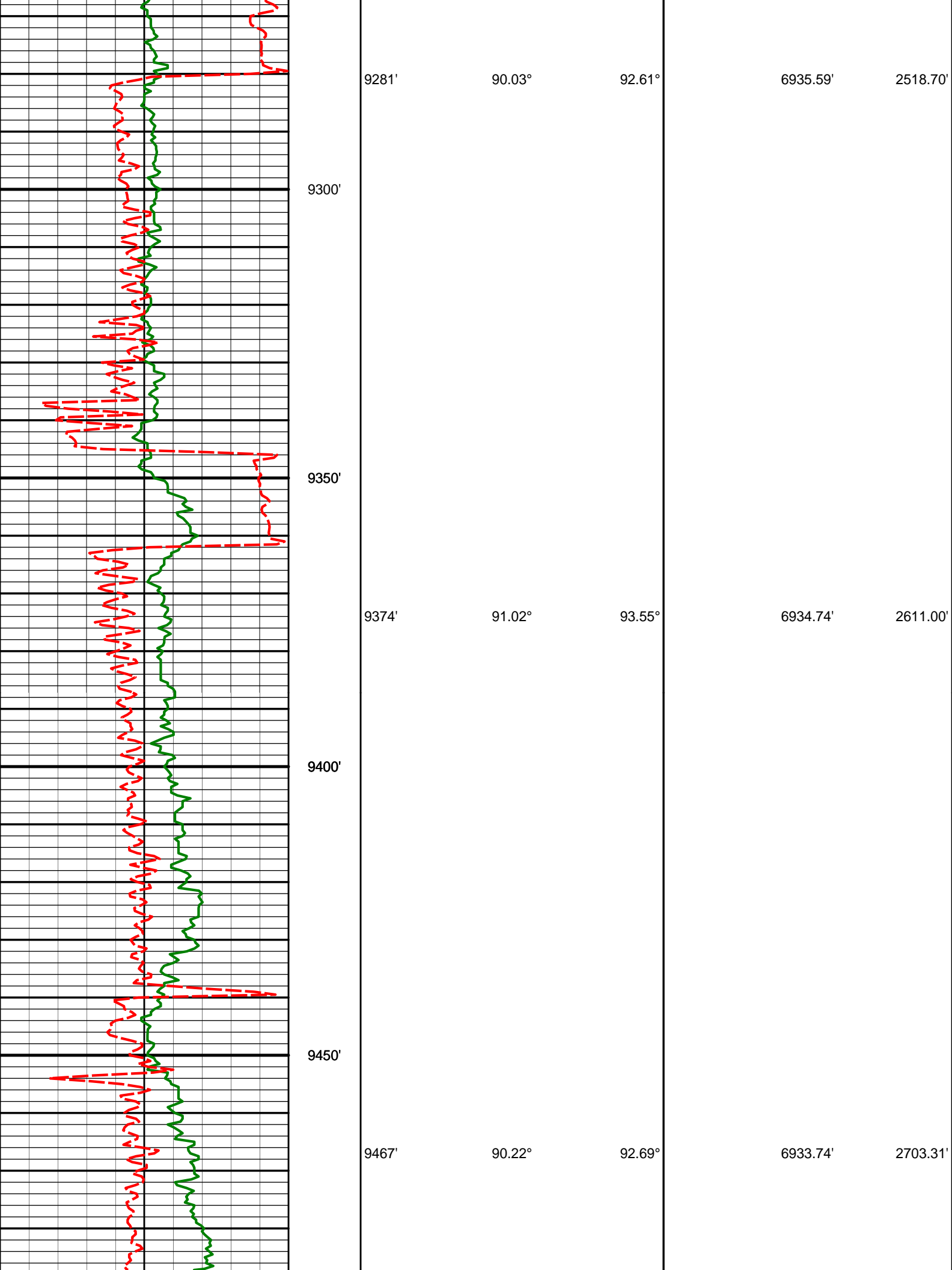
1598.27'

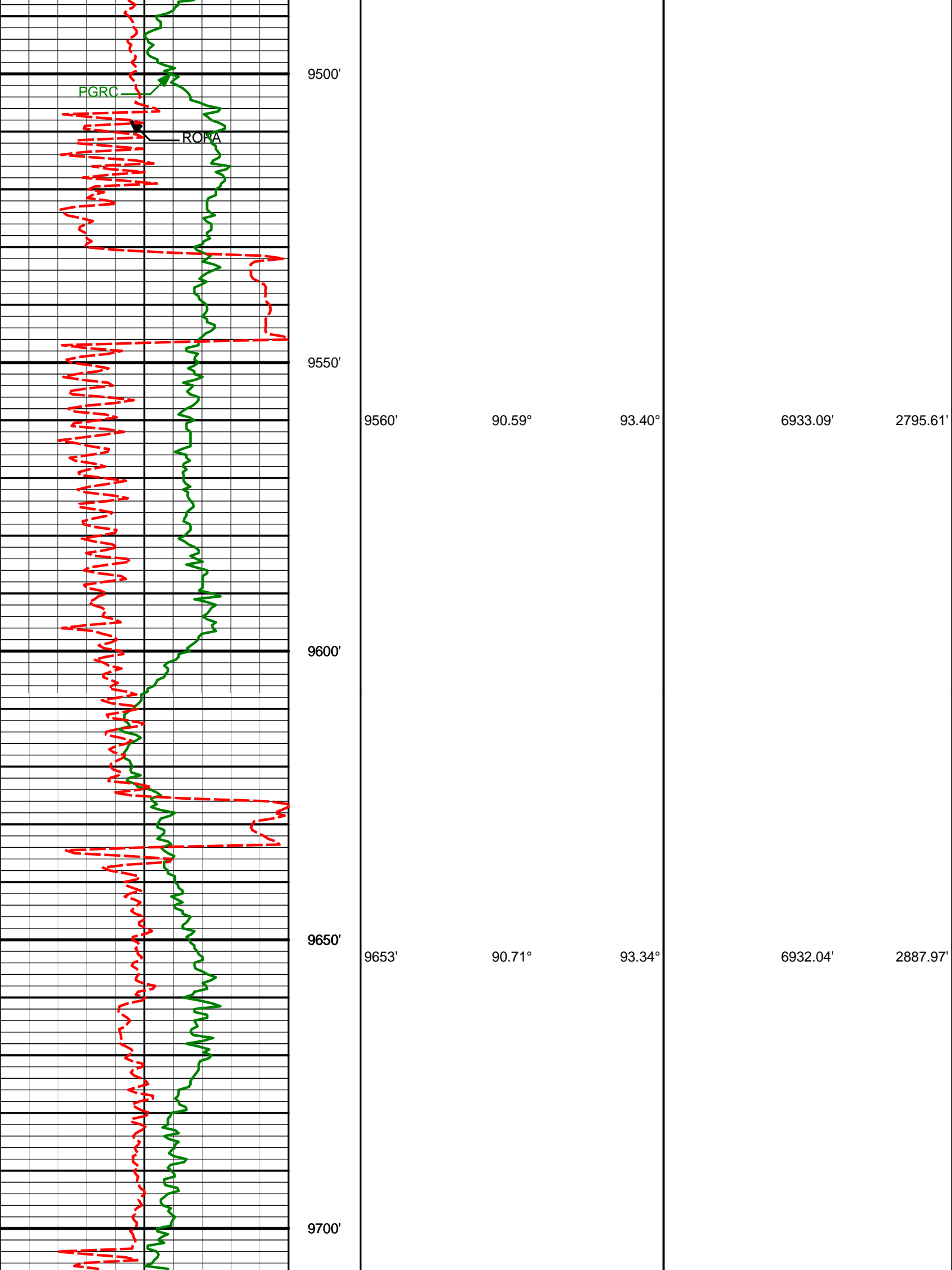


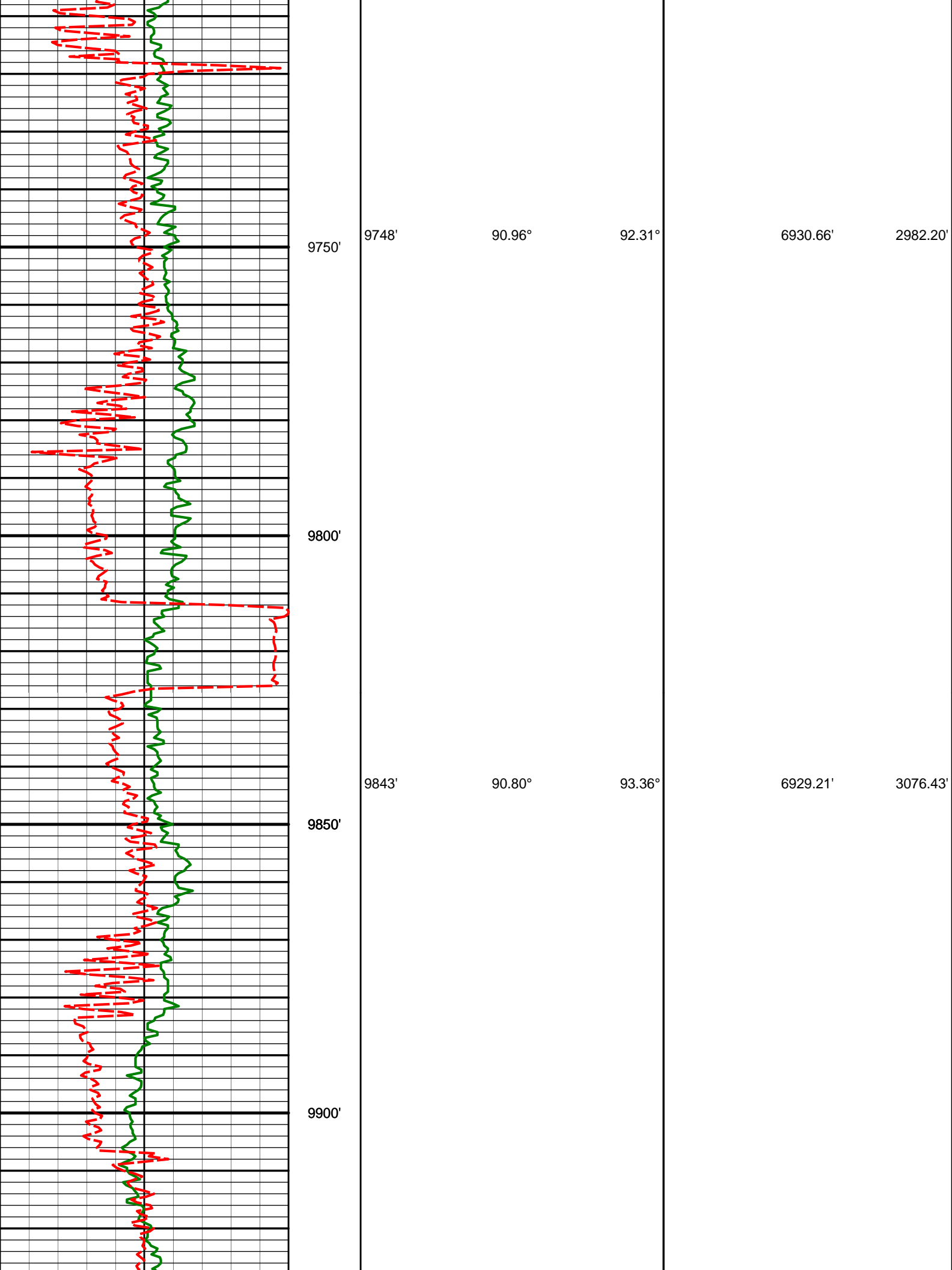


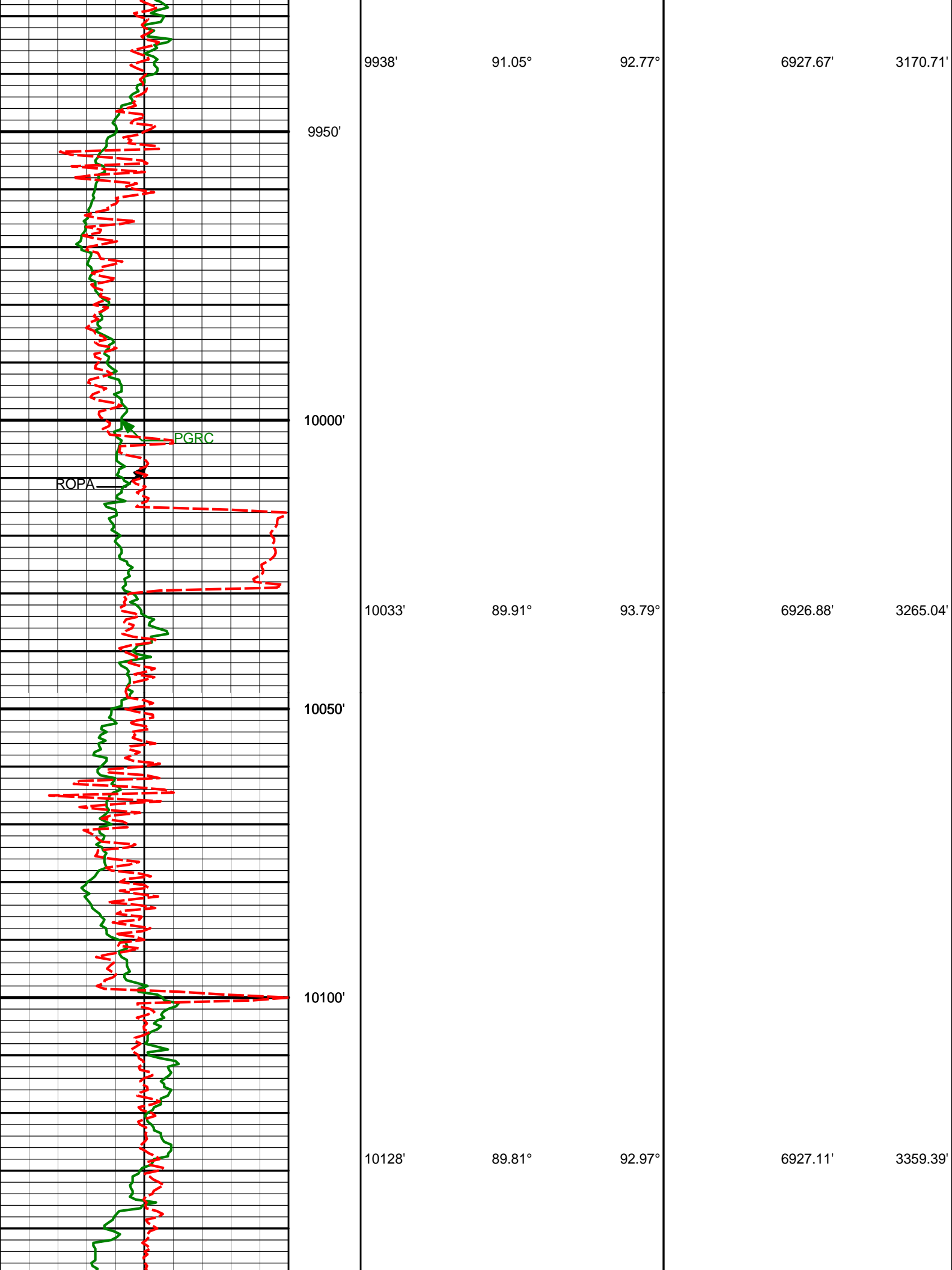


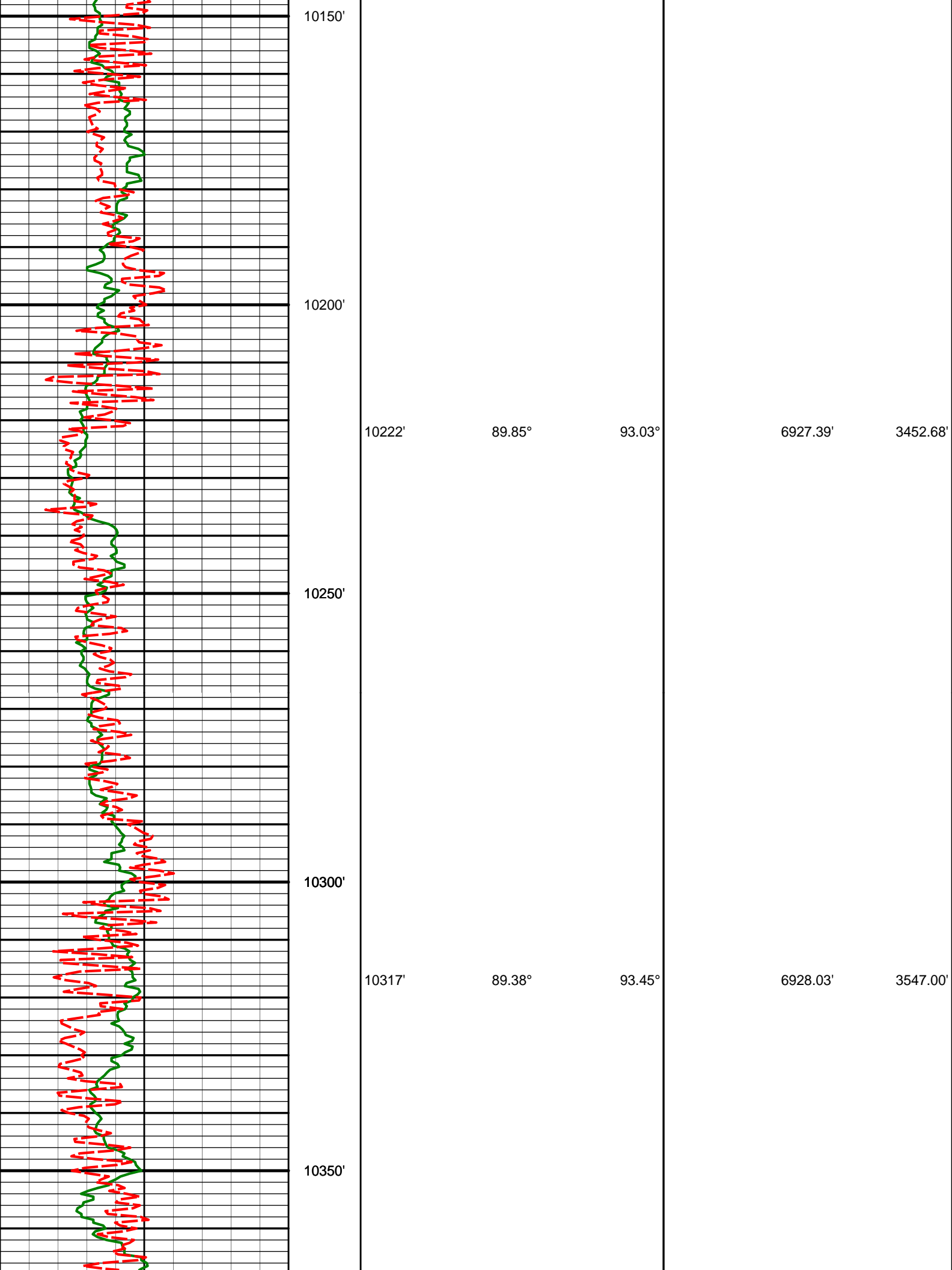


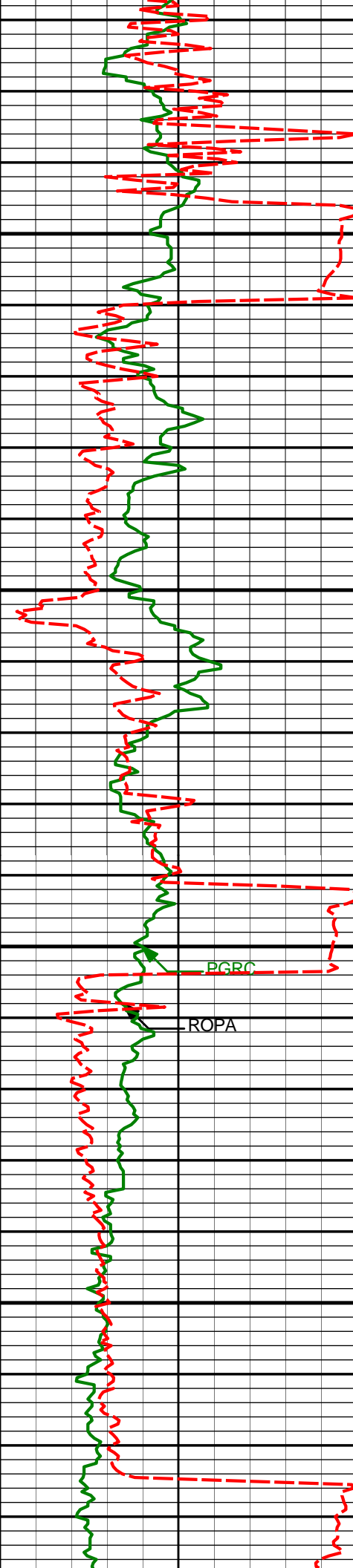












10400'

10450'

10500'

10550'

10412'

89.78°

91.79°

6928.72'

3641.19'

10507'

90.59°

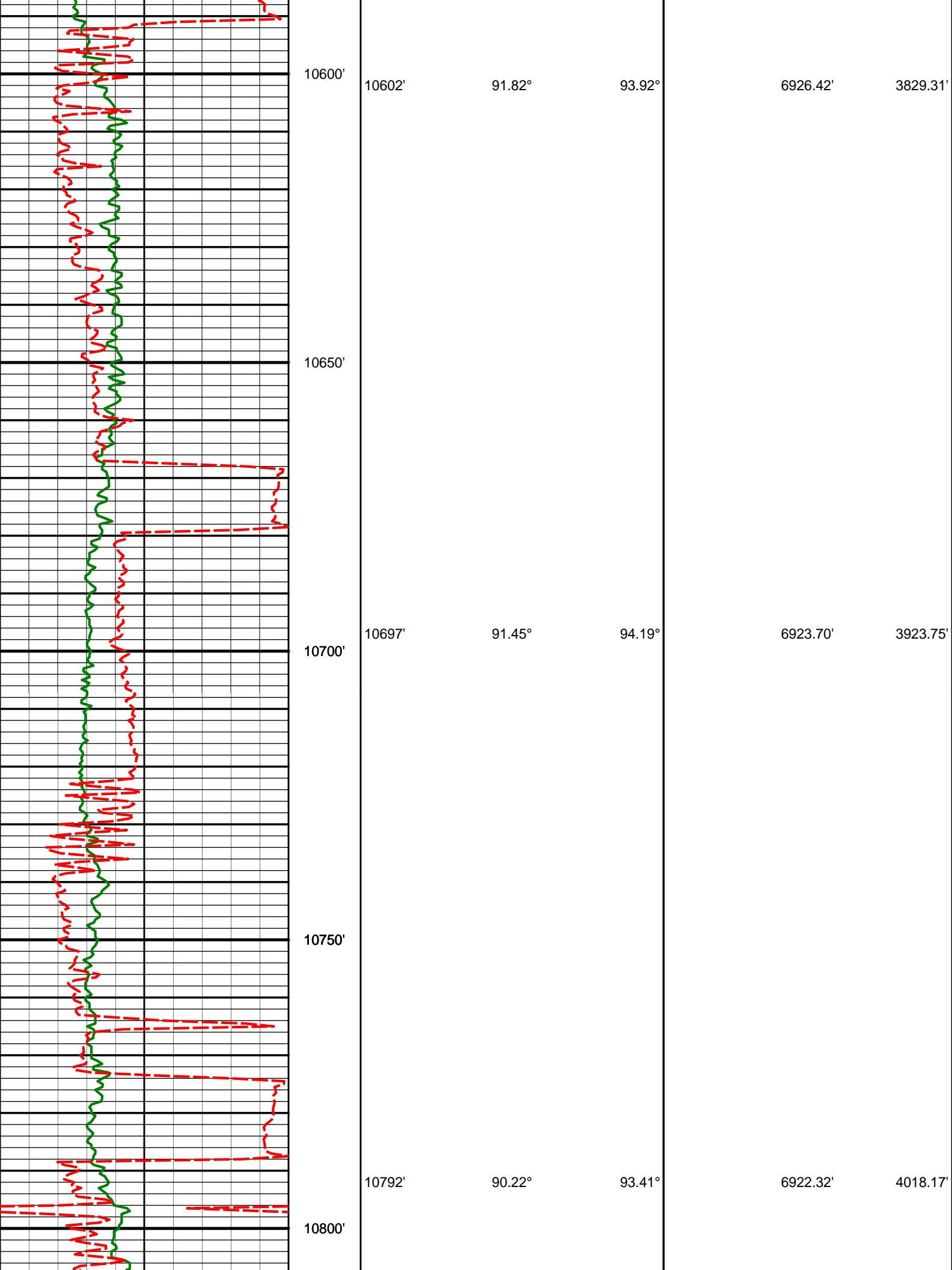
91.33°

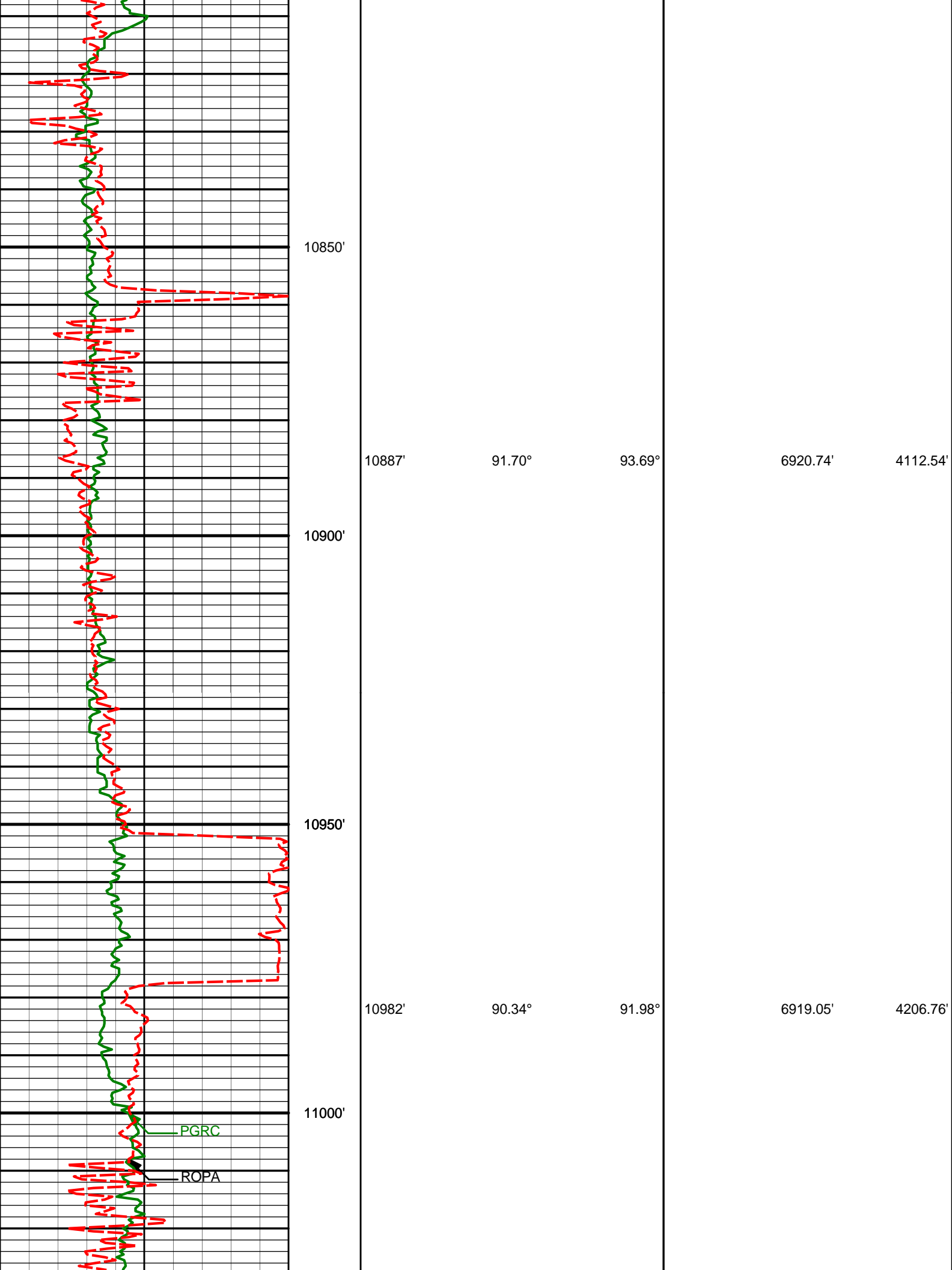
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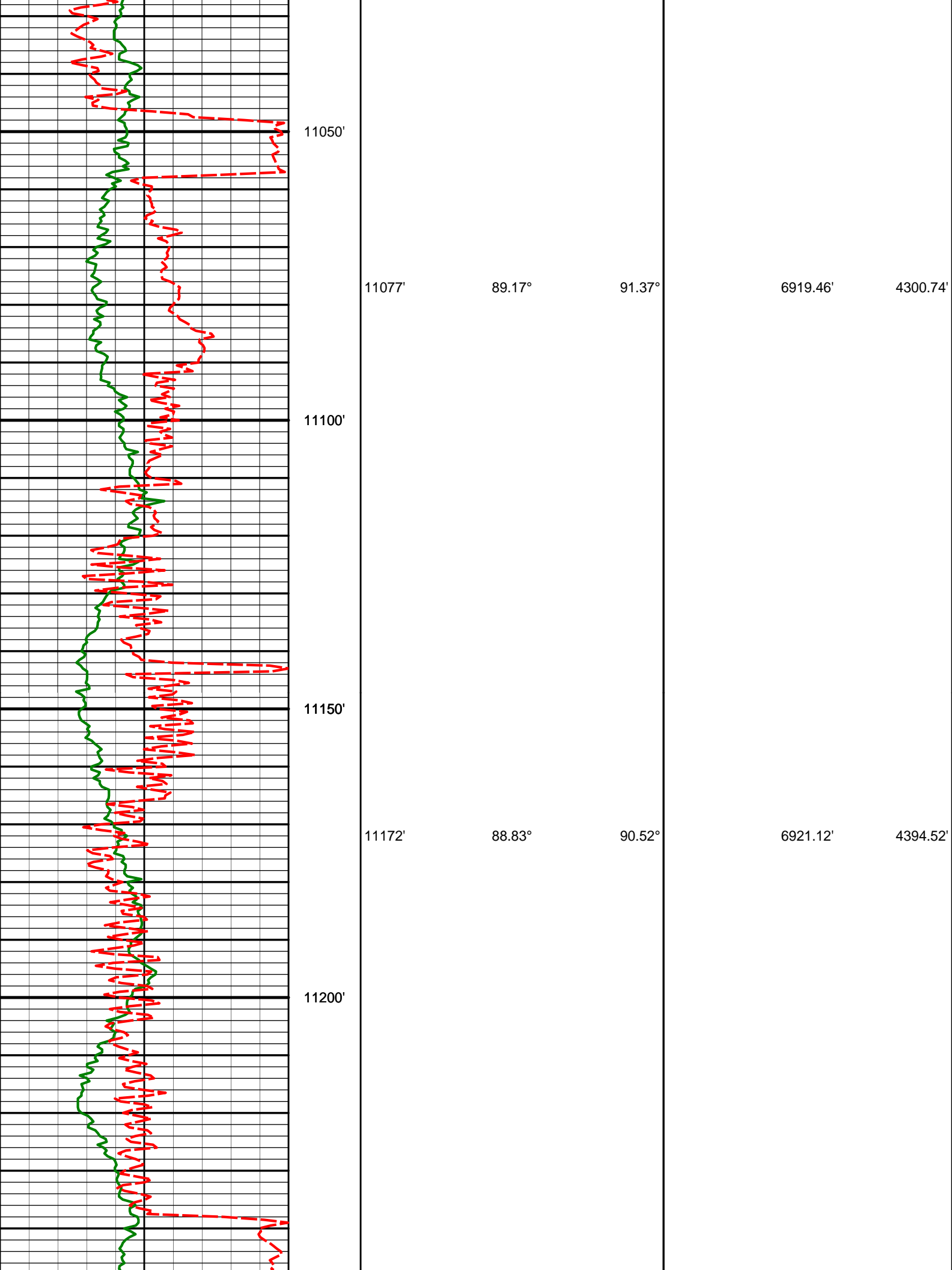
3735.14'

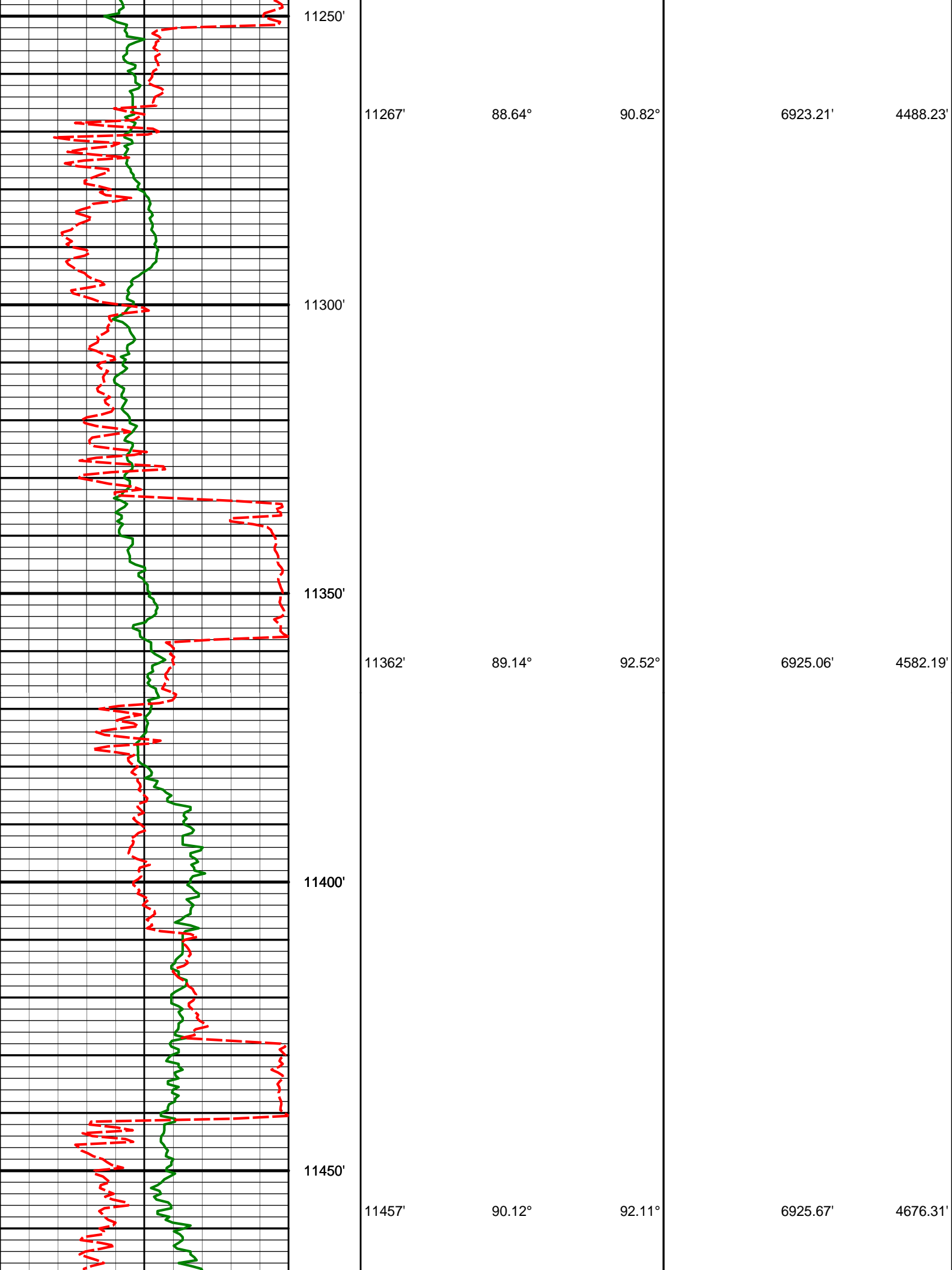
PGRC

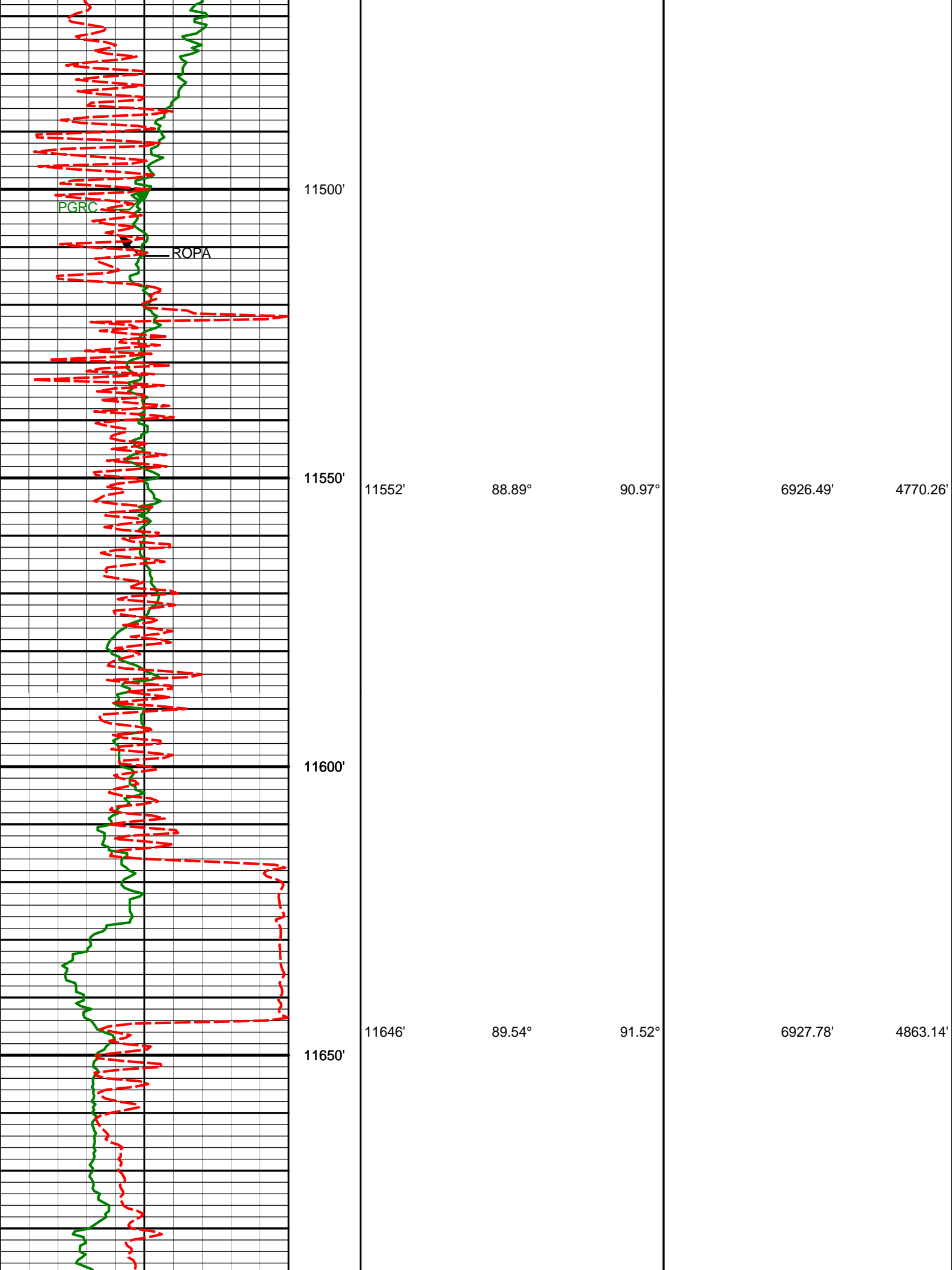
ROPA

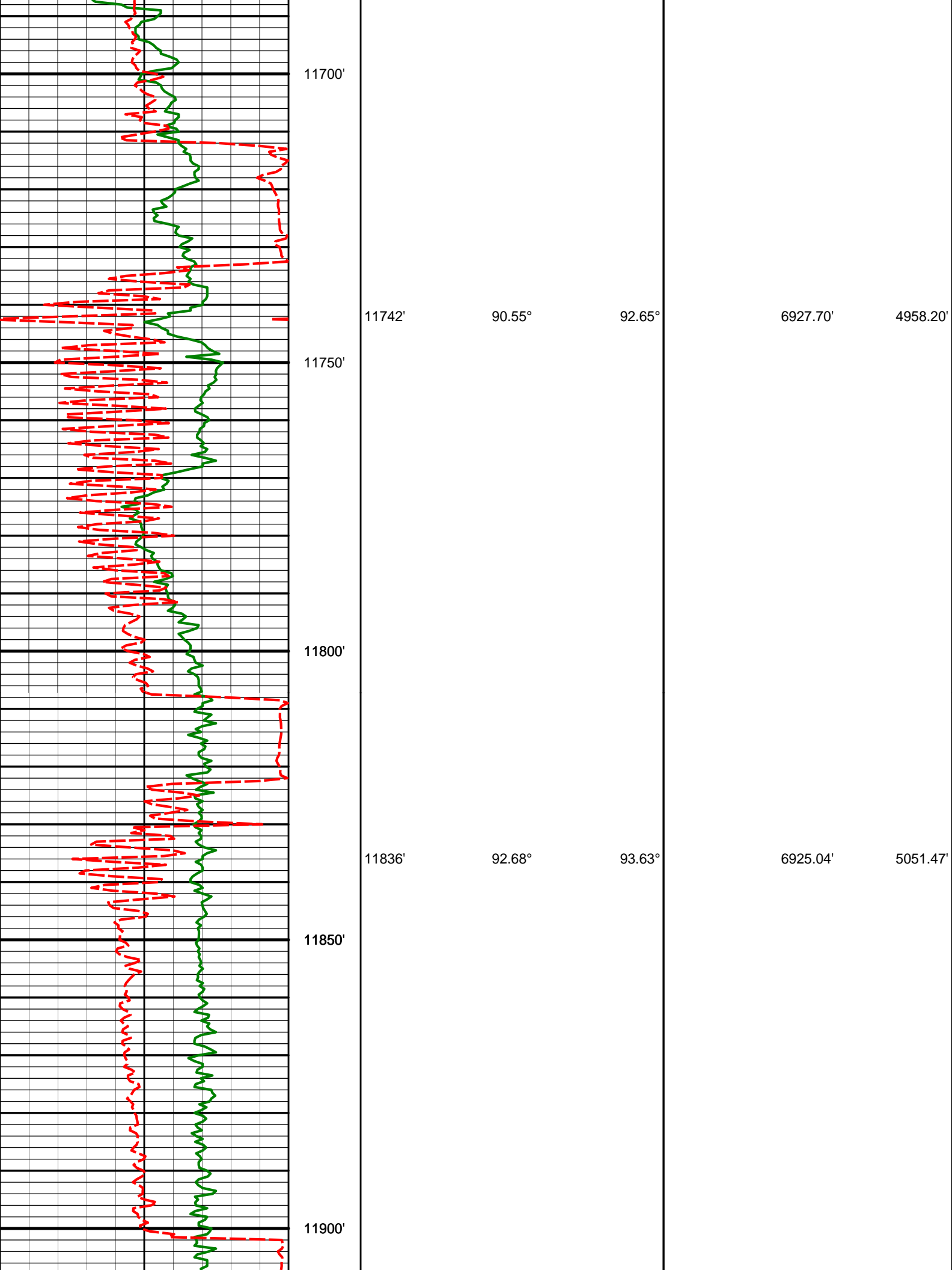


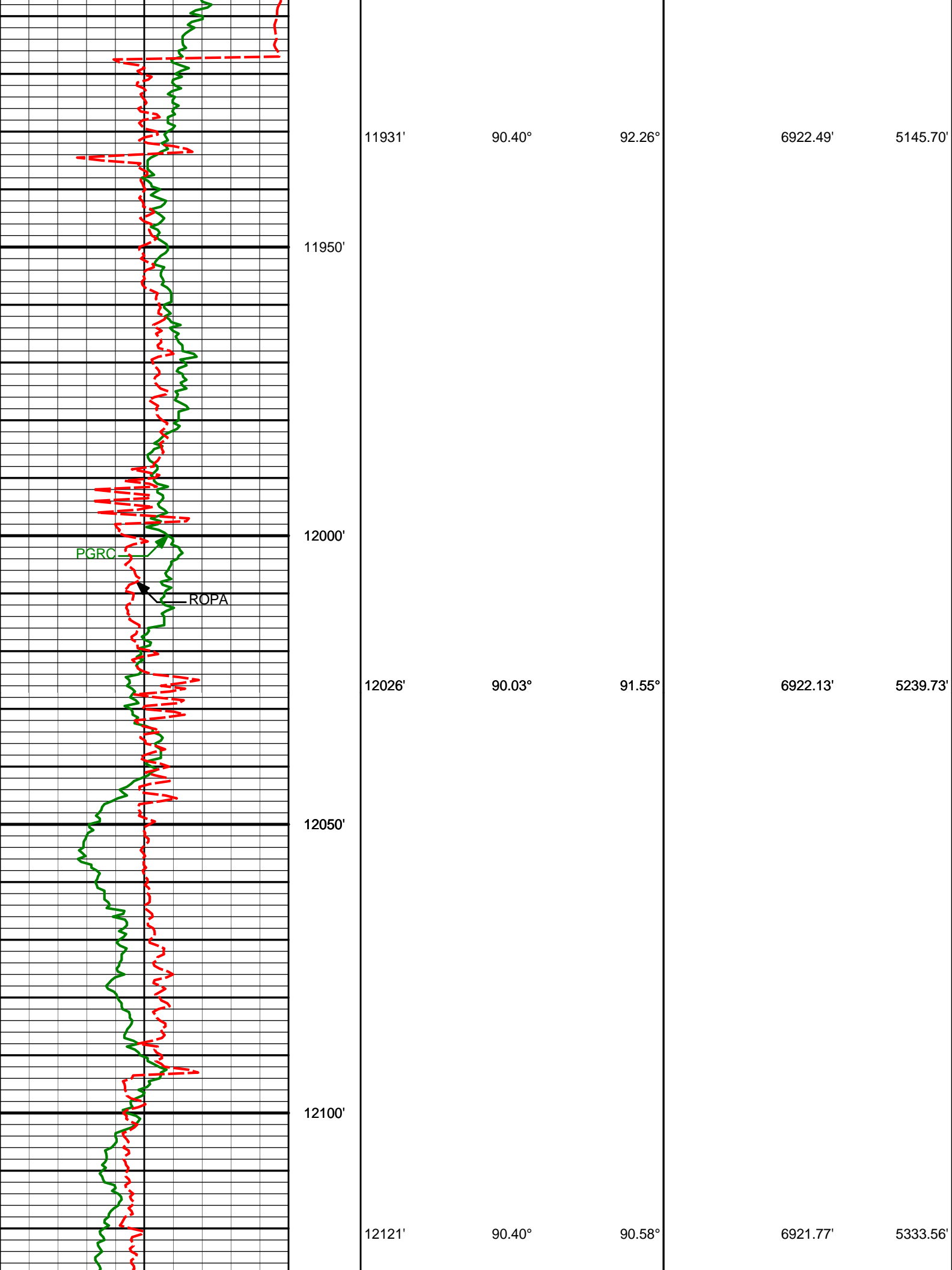


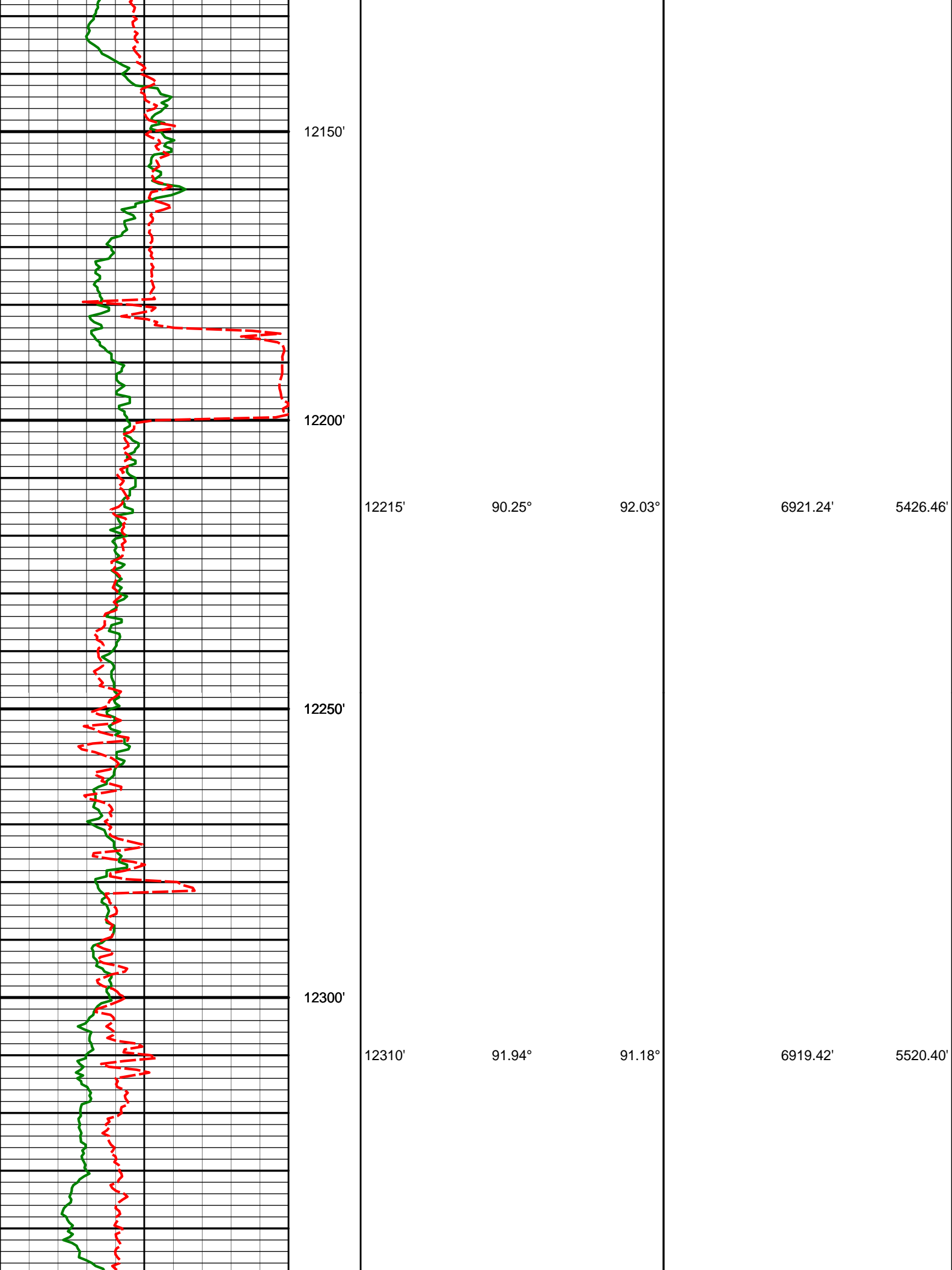


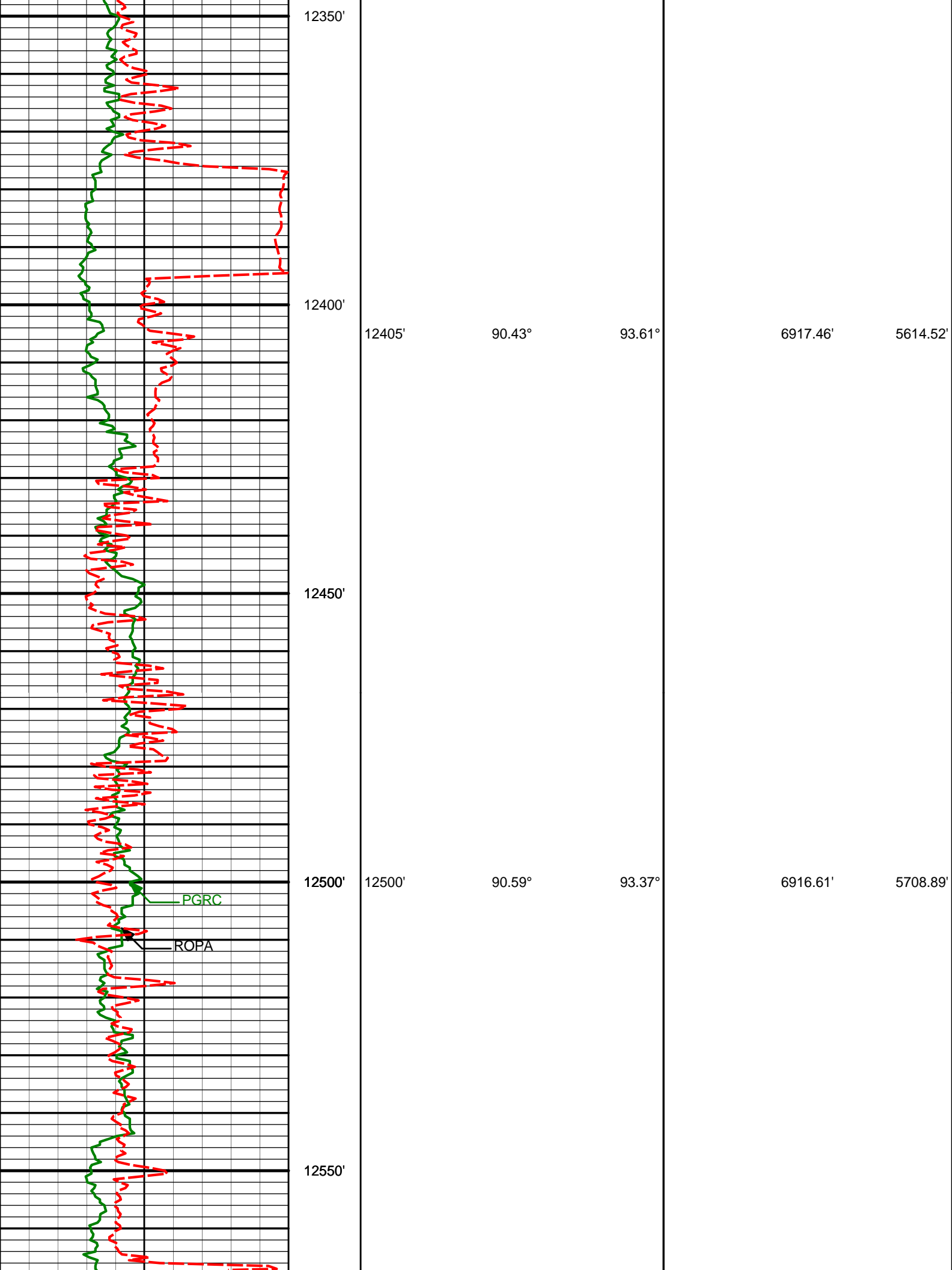


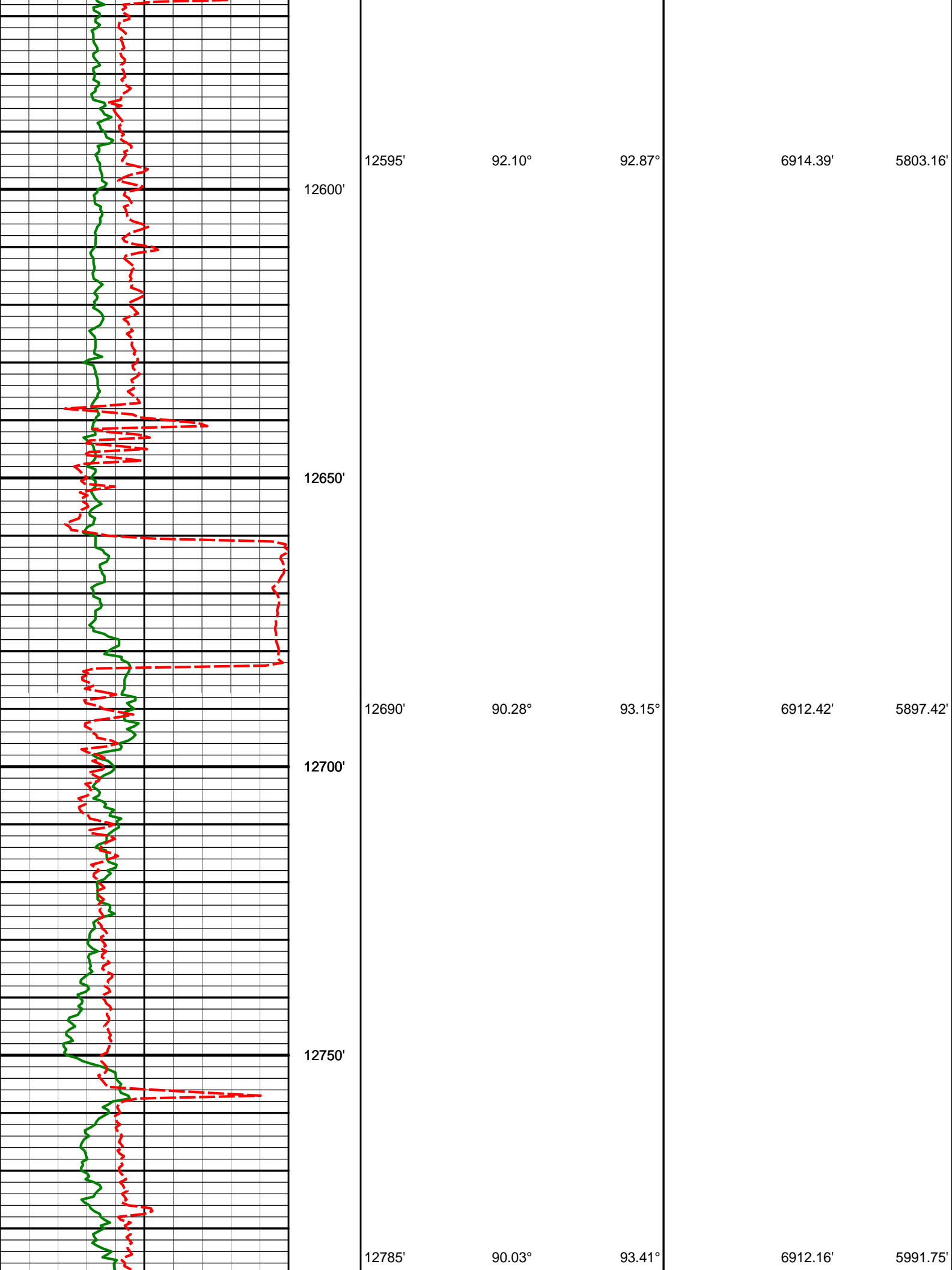


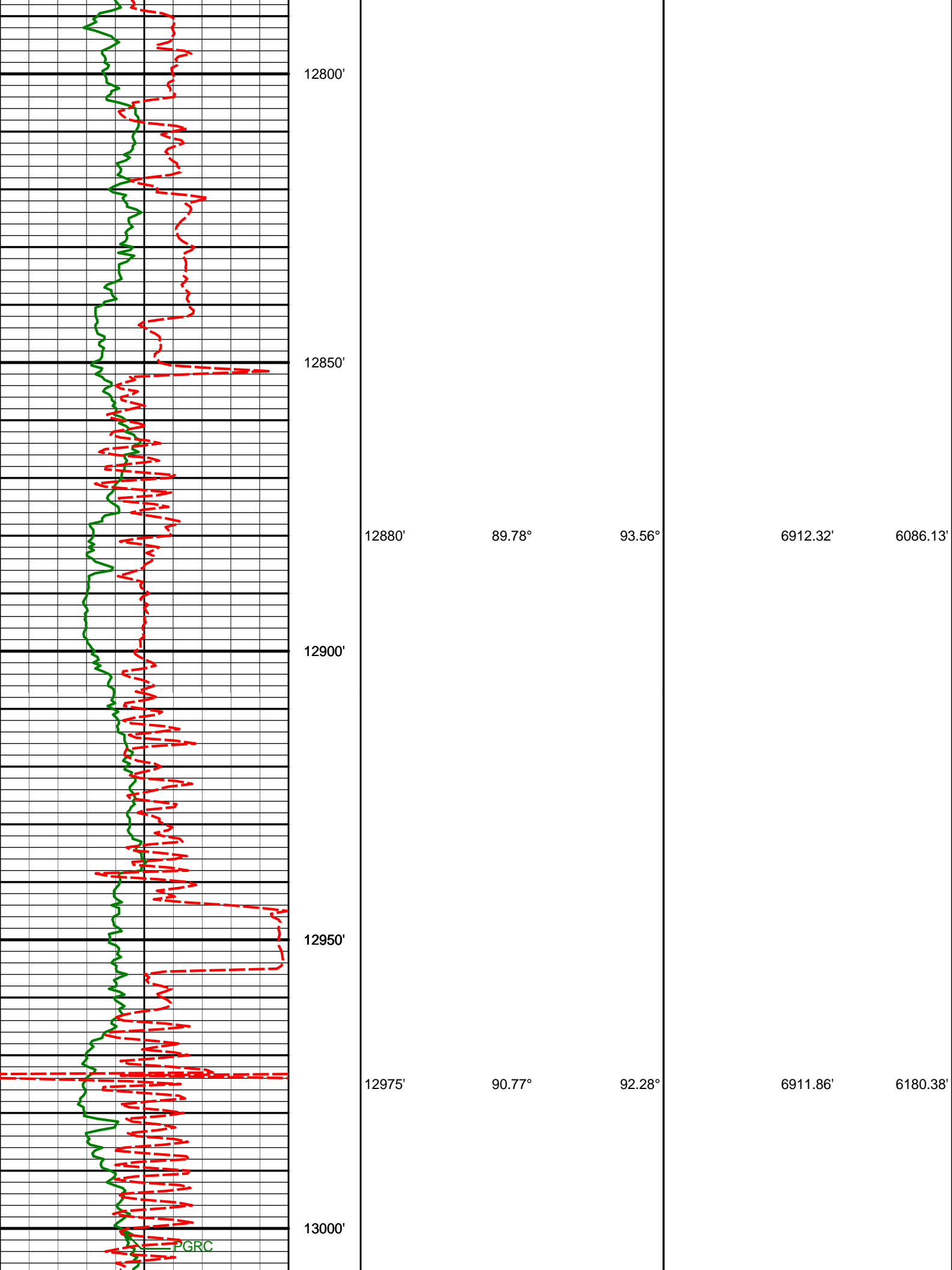


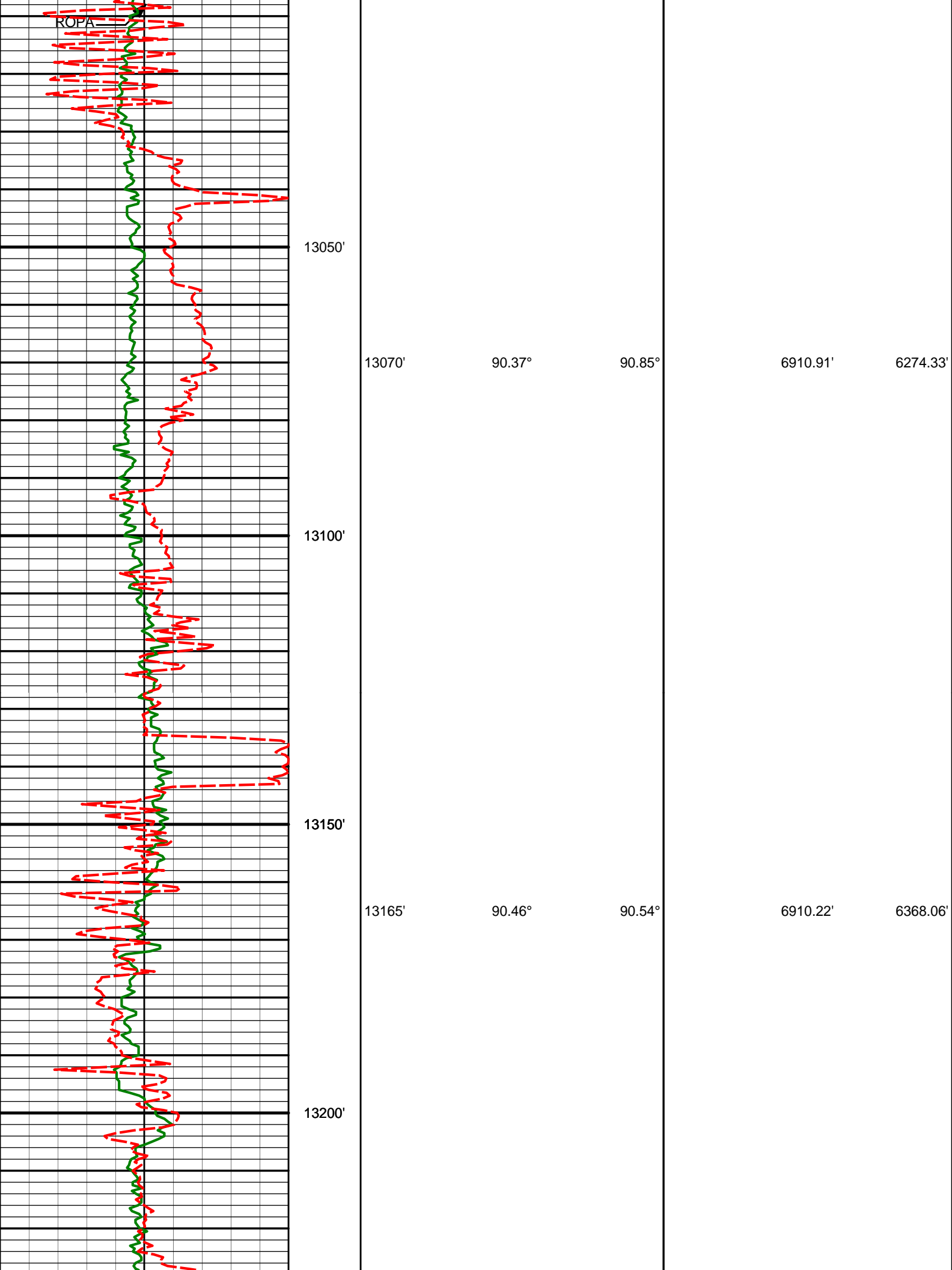


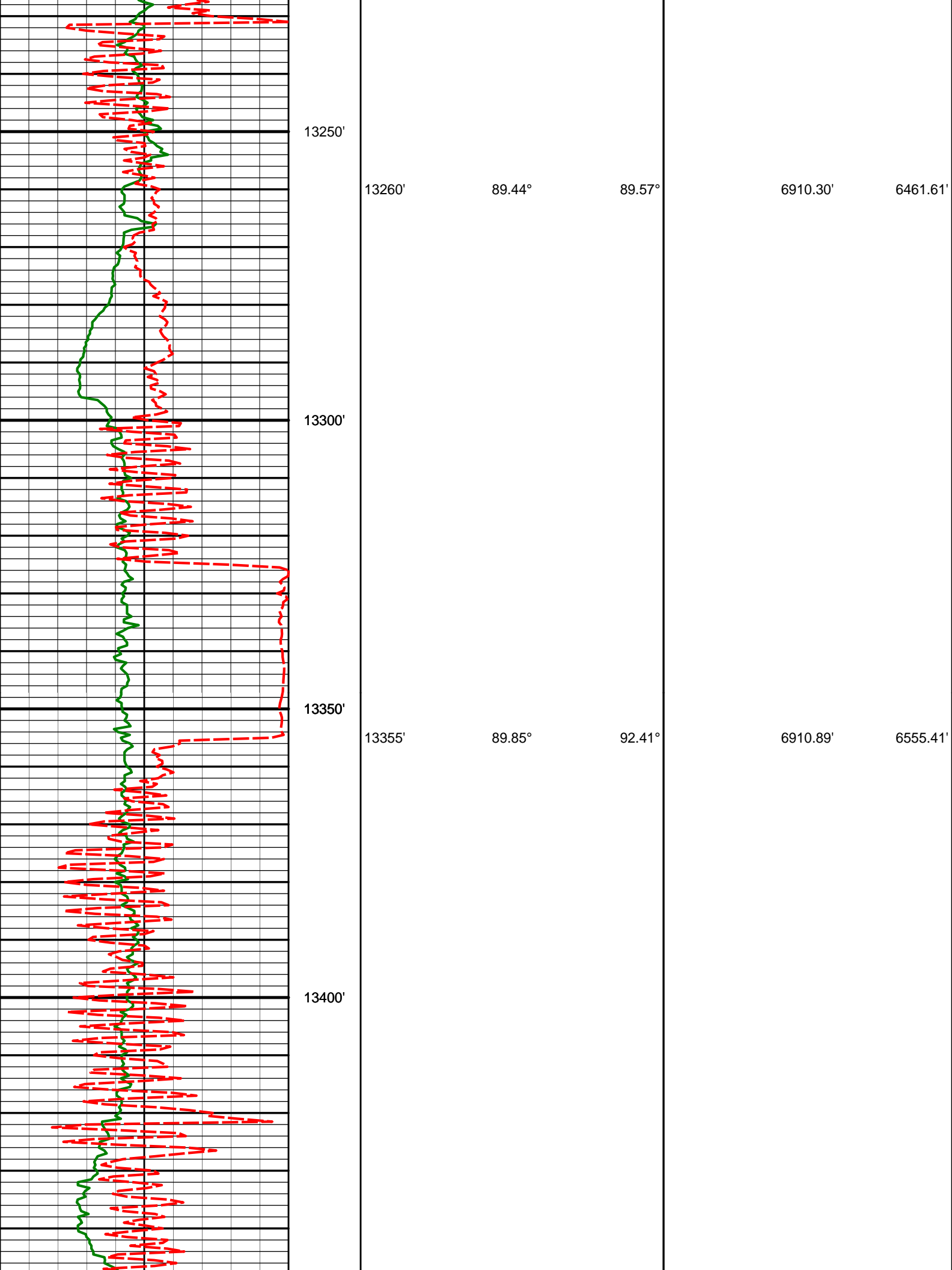


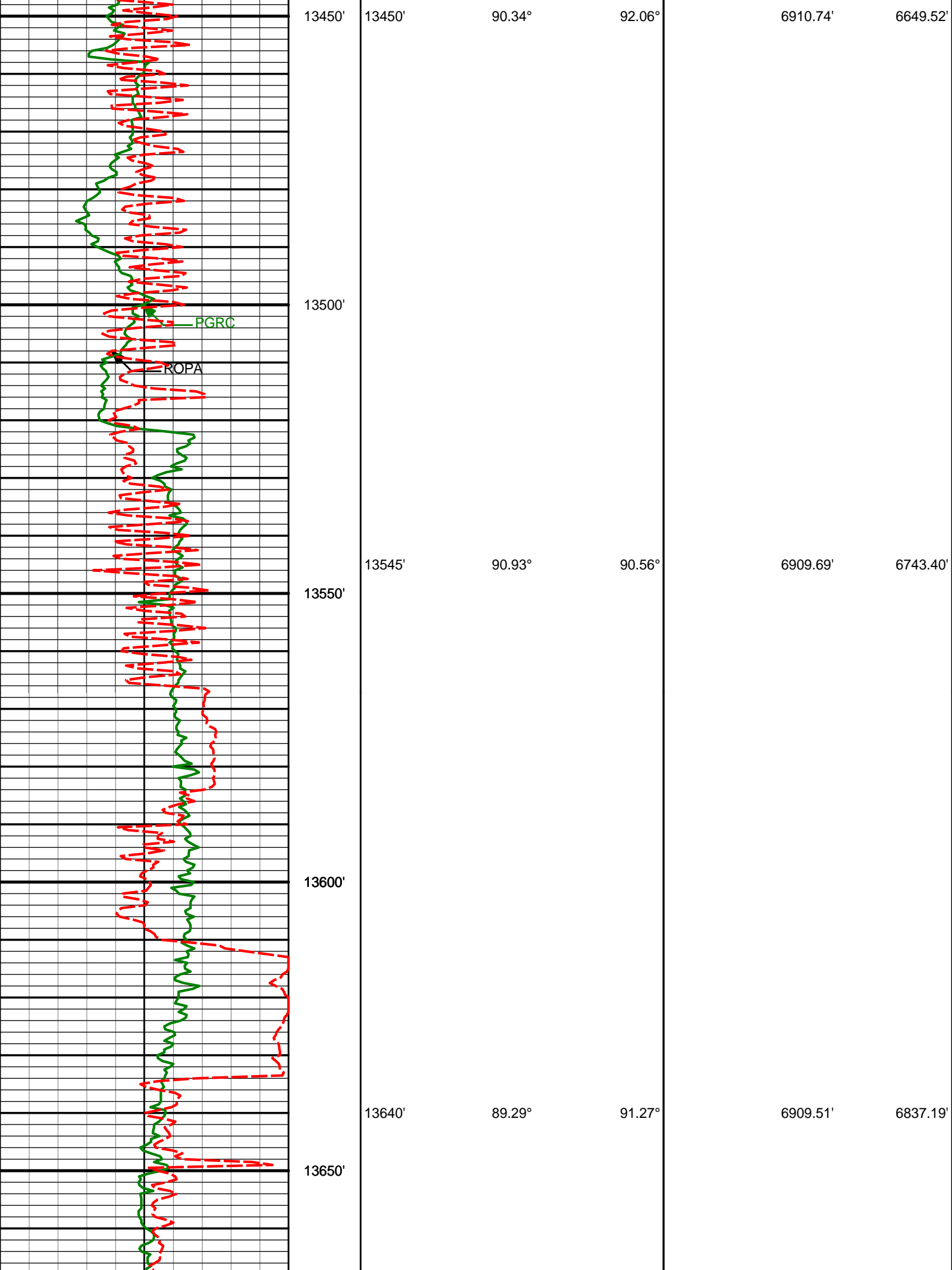


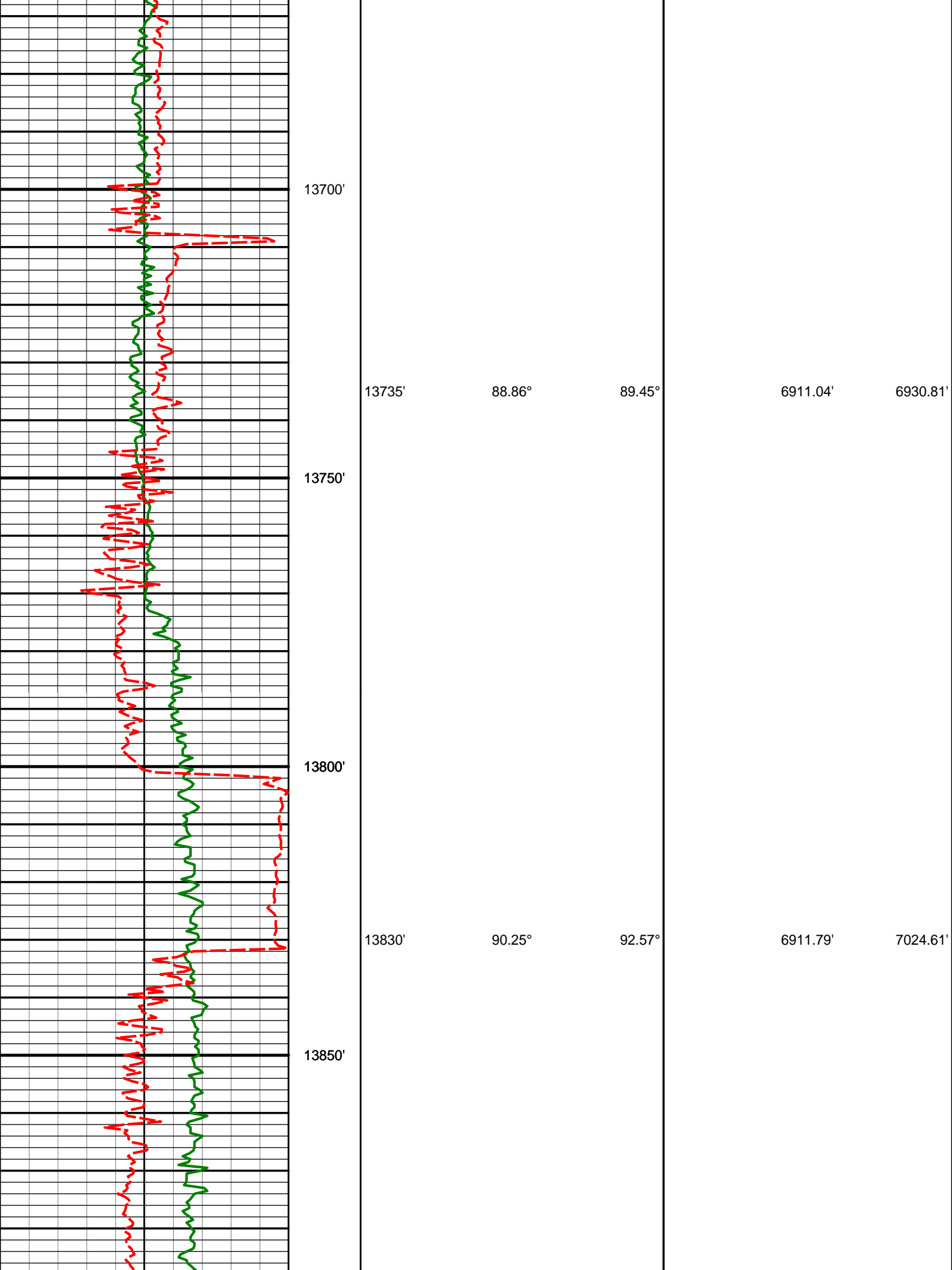


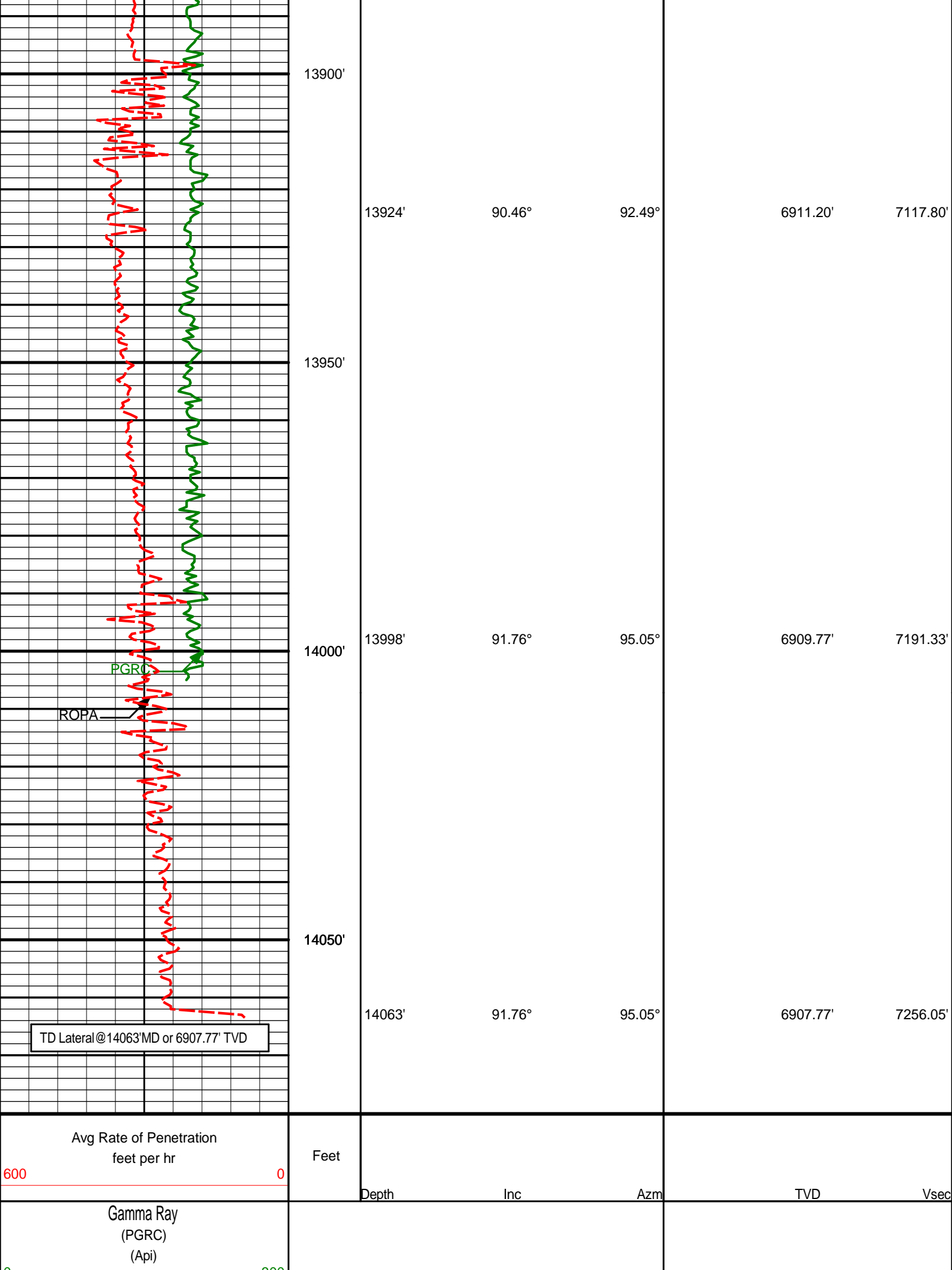














HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Five M E28-67HN
Wattenberg
Weld Colorado
USA
CA-XX-0009939851

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
785.00	0.00	0.00	785.00	0.00 N	0.00 E	0.00	TIE-IN
920.00	0.17	217.37	920.00	0.16 S	0.12 W	-0.09	0.13
1199.00	0.39	203.40	1199.00	1.36 S	0.76 W	-0.51	0.08
1478.00	0.46	229.90	1477.99	2.95 S	1.98 W	-1.44	0.07
1757.00	0.50	200.87	1756.98	4.80 S	3.27 W	-2.38	0.09
2040.00	0.36	193.46	2039.97	6.81 S	3.92 W	-2.67	0.05
2325.00	0.87	64.54	2324.96	6.74 S	2.17 W	-0.95	0.40
2515.00	0.95	159.02	2514.95	7.59 S	0.30 W	1.03	0.70
2799.00	1.44	133.21	2798.89	12.24 S	3.15 E	5.25	0.25
2894.00	2.78	174.80	2893.82	15.35 S	4.24 E	6.85	2.05
2989.00	4.57	189.01	2988.63	21.38 S	3.85 E	7.53	2.10
3084.00	6.08	195.31	3083.21	29.97 S	1.93 E	7.14	1.70
3179.00	6.98	194.90	3177.60	40.41 S	0.88 W	6.20	0.95
3274.00	7.80	197.71	3271.81	52.13 S	4.33 W	4.85	0.94
3369.00	9.67	198.64	3365.70	65.84 S	8.84 W	2.80	1.97
3464.00	9.89	197.20	3459.32	81.19 S	13.81 W	0.60	0.35
3558.00	10.27	195.68	3551.87	96.97 S	18.46 W	-1.22	0.49
3654.00	11.25	190.60	3646.18	114.42 S	22.50 W	-2.14	1.42
3749.00	12.95	191.71	3739.07	133.95 S	26.36 W	-2.53	1.81
3843.00	14.16	191.25	3830.45	155.55 S	30.75 W	-3.07	1.29
3938.00	14.80	195.07	3922.43	178.67 S	36.17 W	-4.37	1.21
4033.00	13.59	197.15	4014.53	201.04 S	42.61 W	-6.80	1.38
4128.00	11.54	197.49	4107.25	220.77 S	48.76 W	-9.41	2.16
4223.00	11.00	198.25	4200.42	238.44 S	54.46 W	-11.92	0.58
4318.00	10.32	198.63	4293.78	255.12 S	60.01 W	-14.48	0.72
4413.00	10.87	191.61	4387.16	271.95 S	64.53 W	-15.99	1.48
4508.00	11.06	198.55	4480.43	289.37 S	69.24 W	-17.57	1.40
4603.00	11.16	198.99	4573.65	306.70 S	75.13 W	-20.34	0.14
4698.00	10.89	197.99	4666.89	323.94 S	80.89 W	-23.01	0.35
4793.00	11.23	201.03	4760.13	341.11 S	86.98 W	-26.00	0.71
4887.00	11.79	197.35	4852.24	358.82 S	93.13 W	-28.96	0.98
4982.00	11.51	197.17	4945.29	377.13 S	98.82 W	-31.36	0.30
5077.00	11.96	191.08	5038.30	395.85 S	103.51 W	-32.70	1.39
5172.00	13.23	187.81	5131.02	416.28 S	106.88 W	-32.45	1.52
5267.00	12.15	189.33	5223.70	436.91 S	109.98 W	-31.89	1.18
5362.00	11.34	184.96	5316.71	456.09 S	112.41 W	-30.93	1.26
5457.00	11.16	185.01	5409.88	474.55 S	114.02 W	-29.29	0.20
5551.00	10.51	183.99	5502.21	492.16 S	115.41 W	-27.58	0.72
5646.00	11.18	187.82	5595.51	509.93 S	117.27 W	-26.30	1.04
5741.00	10.84	184.92	5688.76	527.95 S	119.29 W	-25.13	0.69
5836.00	10.86	182.88	5782.07	545.78 S	120.50 W	-23.21	0.40
5930.00	10.74	178.65	5874.40	563.38 S	120.74 W	-20.37	0.85
6025.00	11.72	172.93	5967.58	581.81 S	119.34 W	-15.77	1.56
6053.00	12.82	172.75	5994.94	587.72 S	118.60 W	-14.01	3.92
6114.00	13.59	175.50	6054.33	601.58 S	117.18 W	-10.19	1.63
6161.00	14.78	173.95	6099.90	613.04 S	116.12 W	-7.14	2.65
6209.00	16.72	178.71	6146.10	626.03 S	115.32 W	-4.08	4.86
6256.00	17.96	181.80	6190.96	640.04 S	115.39 W	-1.70	3.29
6304.00	20.74	181.72	6236.24	655.93 S	115.88 W	0.60	5.79
6351.00	22.39	185.30	6279.95	673.17 S	116.96 W	2.55	4.50
6399.00	26.40	181.06	6323.66	692.95 S	118.00 W	4.98	9.10
6446.00	28.19	171.99	6365.45	714.40 S	116.64 W	10.07	9.63
6494.00	28.91	158.70	6407.65	736.46 S	110.84 W	19.64	13.29
6541.00	29.21	150.58	6448.75	757.04 S	101.08 W	32.85	8.40
6588.00	27.96	141.59	6490.04	775.68 S	88.59 W	48.40	9.53

	6635.00	29.20	140.11	6531.31	793.11 S	74.40 W	65.43	3.05
	6683.00	32.63	134.67	6572.50	811.20 S	57.67 W	85.05	9.20
	6730.00	37.64	132.16	6610.93	829.75 S	38.01 W	107.65	11.09
	6778.00	41.97	124.13	6647.82	848.61 S	13.84 W	134.76	13.99
	6825.00	44.53	118.06	6682.06	865.19 S	13.73 E	164.80	10.39
	6873.00	47.23	114.24	6715.48	880.35 S	44.66 E	197.90	8.01
	6920.00	49.95	111.77	6746.57	894.11 S	77.10 E	232.25	7.00
	6967.00	50.05	111.02	6776.78	907.24 S	110.63 E	267.55	1.25
	7014.00	51.72	111.08	6806.43	920.34 S	144.66 E	303.35	3.56
	7062.00	54.52	108.45	6835.23	933.30 S	180.79 E	341.19	7.29
	7109.00	59.57	106.43	6860.80	945.09 S	218.41 E	380.29	11.32
	7157.00	64.14	104.37	6883.44	956.31 S	259.20 E	422.42	10.24
	7204.00	68.72	103.74	6902.23	966.77 S	300.98 E	465.38	9.83
	7252.00	72.59	101.41	6918.13	976.61 S	345.17 E	510.62	9.26
	7299.00	78.06	99.40	6930.03	984.81 S	389.87 E	556.06	12.37
	7347.00	83.63	97.33	6937.67	991.69 S	436.74 E	603.41	12.36
	7411.00	88.67	94.32	6941.96	998.16 S	500.24 E	667.06	9.17
	7506.00	88.98	94.30	6943.90	1005.29 S	594.95 E	761.56	0.32
	7601.00	89.82	92.20	6944.90	1010.67 S	689.79 E	855.88	2.37
	7695.00	89.82	91.29	6945.20	1013.54 S	783.74 E	948.89	0.97
	7790.00	89.78	91.25	6945.54	1015.64 S	878.72 E	1042.77	0.06
	7885.00	91.42	92.04	6944.54	1018.36 S	973.67 E	1136.73	1.91
	7978.00	91.76	91.97	6941.96	1021.62 S	1066.58 E	1228.78	0.38
	8072.00	90.49	92.73	6940.11	1025.46 S	1160.48 E	1321.90	1.57
	8165.00	88.61	92.72	6940.84	1029.88 S	1253.36 E	1414.13	2.03
	8258.00	90.22	92.10	6941.79	1033.79 S	1346.27 E	1506.29	1.85
	8351.00	89.07	91.09	6942.37	1036.38 S	1439.23 E	1598.27	1.64
	8444.00	90.49	92.05	6942.72	1038.92 S	1532.19 E	1690.25	1.84
	8537.00	90.55	92.27	6941.87	1042.43 S	1625.13 E	1782.36	0.25
	8630.00	91.51	92.57	6940.19	1046.35 S	1718.03 E	1874.52	1.08
	8723.00	89.04	91.15	6939.75	1049.37 S	1810.97 E	1966.55	3.06
	8816.00	90.52	91.54	6940.10	1051.55 S	1903.94 E	2058.47	1.65
	8909.00	90.89	91.47	6938.95	1054.00 S	1996.90 E	2150.43	0.41
	9002.00	91.70	92.73	6936.84	1057.40 S	2089.81 E	2242.50	1.60
	9095.00	90.46	92.41	6935.09	1061.57 S	2182.70 E	2334.69	1.37
	9188.00	89.44	90.89	6935.17	1064.25 S	2275.65 E	2426.68	1.96
	9281.00	90.03	92.61	6935.59	1067.09 S	2368.61 E	2518.70	1.95
	9374.00	91.02	93.55	6934.74	1072.08 S	2461.47 E	2611.00	1.46
	9467.00	90.22	92.69	6933.74	1077.15 S	2554.32 E	2703.31	1.26
	9560.00	90.59	93.40	6933.09	1082.09 S	2647.19 E	2795.61	0.86
	9653.00	90.71	93.34	6932.04	1087.56 S	2740.02 E	2887.97	0.15
	9748.00	90.96	92.31	6930.66	1092.24 S	2834.89 E	2982.20	1.12
	9843.00	90.80	93.36	6929.21	1096.94 S	2929.76 E	3076.43	1.12
	9938.00	91.05	92.77	6927.67	1102.02 S	3024.62 E	3170.71	0.67
	10033.00	89.91	93.79	6926.88	1107.45 S	3119.45 E	3265.04	1.61
	10128.00	89.81	92.97	6927.11	1113.06 S	3214.29 E	3359.39	0.87
	10222.00	89.85	93.03	6927.39	1117.99 S	3308.16 E	3452.68	0.07
	10317.00	89.38	93.45	6928.03	1123.36 S	3403.00 E	3547.00	0.66
	10412.00	89.78	91.79	6928.72	1127.70 S	3497.90 E	3641.19	1.80
	10507.00	90.59	91.33	6928.41	1130.29 S	3592.86 E	3735.14	0.97
	10602.00	91.82	93.92	6926.42	1134.64 S	3687.73 E	3829.31	3.02
	10697.00	91.45	94.19	6923.70	1141.35 S	3782.45 E	3923.75	0.48
	10792.00	90.22	93.41	6922.32	1147.65 S	3877.23 E	4018.17	1.53
	10887.00	91.70	93.69	6920.74	1153.53 S	3972.03 E	4112.54	1.59
	10982.00	90.34	91.98	6919.05	1158.22 S	4066.90 E	4206.76	2.30
	11077.00	89.17	91.37	6919.46	1160.99 S	4161.85 E	4300.74	1.39
	11172.00	88.83	90.52	6921.12	1162.56 S	4256.83 E	4394.52	0.95
	11267.00	88.64	90.82	6923.21	1163.68 S	4351.80 E	4488.23	0.37
	11362.00	89.14	92.52	6925.06	1166.45 S	4446.73 E	4582.19	1.87
	11457.00	90.12	92.11	6925.67	1170.30 S	4541.65 E	4676.31	1.13
	11552.00	88.89	90.97	6926.49	1172.85 S	4636.61 E	4770.26	1.77
	11646.00	89.54	91.52	6927.78	1174.90 S	4730.58 E	4863.14	0.90
	11742.00	90.55	92.65	6927.70	1178.40 S	4826.51 E	4958.20	1.58
	11836.00	92.68	93.63	6925.04	1183.54 S	4920.33 E	5051.47	2.49
	11931.00	90.40	92.26	6922.49	1188.42 S	5015.16 E	5145.70	2.80
	12026.00	90.03	91.55	6922.13	1191.58 S	5110.10 E	5239.73	0.84
	12121.00	90.40	90.58	6921.77	1193.35 S	5205.09 E	5333.56	1.10
	12215.00	90.25	92.03	6921.24	1195.48 S	5299.06 E	5426.46	1.55
	12310.00	91.94	91.18	6919.42	1198.14 S	5394.00 E	5520.40	2.00
	12405.00	90.43	93.61	6917.46	1202.10 S	5488.89 E	5614.52	3.01
	12500.00	90.59	93.37	6916.61	1207.89 S	5583.71 E	5708.89	0.30
	12595.00	92.10	92.87	6914.39	1213.06 S	5678.54 E	5803.16	1.67
	12690.00	90.28	93.15	6912.42	1218.05 S	5773.38 E	5897.42	1.94
	12785.00	90.03	93.41	6912.16	1223.49 S	5868.22 E	5991.75	0.38
	12880.00	89.78	93.56	6912.32	1229.27 S	5963.05 E	6086.13	0.30

12975.00	90.77	92.28	6911.86	1234.11 S	6057.92 E	6180.38	1.70
13070.00	90.37	90.85	6910.91	1236.71 S	6152.88 E	6274.33	1.57
13165.00	90.46	90.54	6910.22	1237.86 S	6247.87 E	6368.06	0.33
13260.00	89.44	89.57	6910.30	1237.96 S	6342.86 E	6461.61	1.48
13355.00	89.85	92.41	6910.89	1239.60 S	6437.84 E	6555.41	3.02
13450.00	90.34	92.06	6910.74	1243.30 S	6532.77 E	6649.52	0.64
13545.00	90.93	90.56	6909.69	1245.47 S	6627.73 E	6743.40	1.69
13640.00	89.29	91.27	6909.51	1246.99 S	6722.72 E	6837.19	1.88
13735.00	88.86	89.45	6911.04	1247.59 S	6817.70 E	6930.81	1.96
13830.00	90.25	92.57	6911.79	1249.27 S	6912.67 E	7024.61	3.59
13924.00	90.46	92.49	6911.20	1253.42 S	7006.57 E	7117.80	0.25
13998.00	91.76	95.05	6909.77	1258.28 S	7080.39 E	7191.33	3.88
14063.00	91.76	95.05	6907.77	1264.00 S	7145.11 E	7256.05	0.00

CALCULATION BASED ON MINIMUM CURVATURE METHOD

**SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT**

**VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A CLOSURE OF 100.03 DEGREES (GRID)
A TOTAL CORRECTION OF 8.14 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 14063.00 FEET
IS 7256.05 FEET ALONG 100.03 DEGREES (GRID)**